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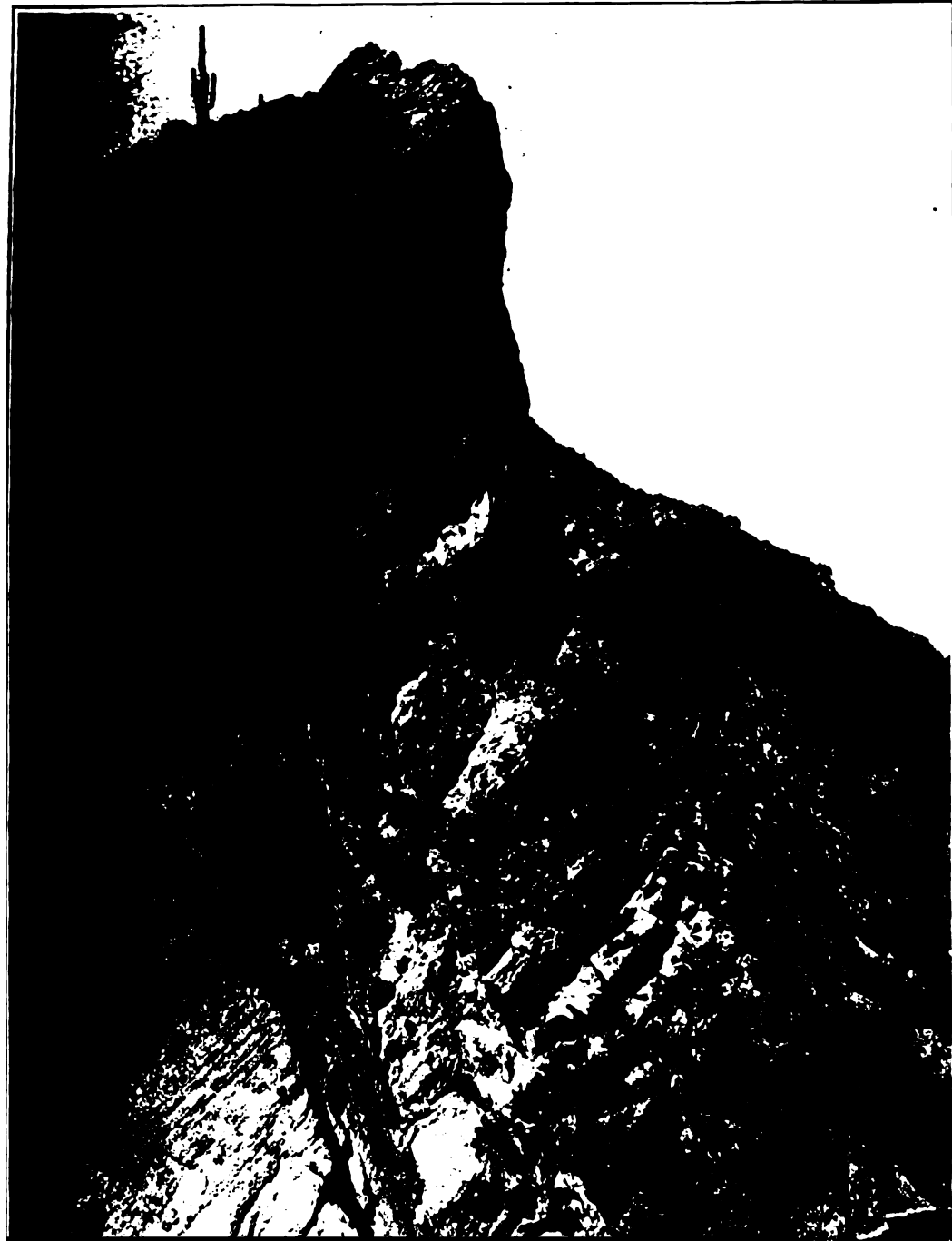
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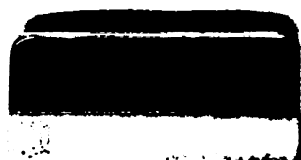
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CONTENTS

- No.
791. San Carlos irrigation project, Arizona.
813. Message of President, Mar. 5, 1914, relating to Panama Canal tolls.
823. Abraham Lincoln, speech of S. D. Fess in House of Representatives.
833. Publicity in making of Government contracts.
840. Invitation to participate in exposition at city of Panama.
852. Relocation of certain rights of way in District of Columbia.
876. Report on coal in Alaska for use in Navy.
892. 6th International Sanitary Conference of American States.
894. International Exposition of Sea Fishery Industries, 1914.
910. Address to Congress by President of United States on situation in Mexico.
914. Prevention of damage by floods.
916. Message of President relative to relief of Americans in Mexico.
919. Supplement 10 to public health reports; Care of the baby.
927. Collection of statistics of coastwise traffic through Panama Canal.
928. 6th International Congress of Chambers of Commerce.
929. Estimate for prevention of epidemic diseases.
971. Report on drainage survey of Red Lake Reservation, Minn.
972. Military policy of United States during Mexican War.
973. Hearings on bill for pensions for survivors of Indian wars.
978. Congress of International Musical Society at Paris, 1914.
997. International Congress on Neurology, Psychiatry, and Psychology.
998. 6th International Dental Congress, London, 1914.
999. Connecting parkway between Potomac and Zoological parks.
1008. Collection of specimens of elk, etc., for Smithsonian Institution.
1028. 9th report of American National Red Cross, calendar year 1913.
1030. Information relative to treaty items in Indian appropriation bill.
1033. Partial payments on public contracts by Commerce Department.
1122. Holder of title to railroads from Atchison to Waterville, Kans.
1124. Relation of railroads to coal companies of Illinois.
1132. International Conference on Social Insurance, Paris, 1914.
1134. First-choice vote for reserve-bank cities.
1136. Relief, protection, and transportation of Americans in Europe.
1137. Relief of American citizens abroad.
1148. Sale of lands in Philippine Islands.
1155. Report on railway mail pay.
1157. Message of President relating to additional revenue.
1158. Emergency appropriation for diplomatic and consular service.
1162. Veto message relative to H. 7967 to amend postal savings-bank act.
1172. Claim of Government of Norway.
1173. Draft of bill relating to Steamboat-Inspection Service.
1179. Request for withdrawal of House document 1175.

SAN CARLOS IRRIGATION PROJECT, ARIZONA

REPORT

TO THE

SECRETARY OF WAR

OF A BOARD OF ENGINEER OFFICERS,
UNITED STATES ARMY, UNDER INDIAN
APPROPRIATION ACT OF AUGUST 24,
1912, ON THE SAN CARLOS IRRIGATION
PROJECT, ARIZONA



FEBRUARY 25, 1914.—Referred to the Committee on Indian Affairs
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WASHINGTON
1914



CONTENTS.

	Paragraphs.
San Carlos Board, order constituting.....	1
Act authorizing present San Carlos project investigation.....	2
Sessions of board.....	4-9
Acknowledgments.....	10-13
San Carlos project, general description.....	14-22
Prior investigations.....	23-57
Origin of question of water storage on Gila.....	23
Lippincott's report.....	27
Schuyler's review thereof.....	28
Investigation of 1903.....	29
Board of reclamation engineers.....	31
Reservoir sites above San Carlos.....	32-33
Decision of Secretary of Interior on application to use dam and reservoir sites.....	34-35
Leighton's report.....	37
Hermann's report.....	38
Quinton's reports.....	39-43
Schuyler and Hawgood's report.....	44
Schuyler's report.....	45
Rosecrans's reports.....	46-53
Schuyler's report on project of Pinal Mutual Irrigation Co.....	54-57
Investigation by present board, outline of.....	58-63
Diamond drilling done.....	64
Upper and lower sites, faults, depth to bedrock, etc.....	65-67, 70, 72-75
Type and height of dam.....	67-68, 71
Spillway.....	69
Cost of dam.....	67-79
Reservoir site, properties of.....	80
Evaporation from reservoir.....	81
Seepage from reservoir.....	82
Run-off of Gila River at San Carlos.....	83-86
Silt, methods of measuring.....	87-88
Silt measurements at San Carlos.....	89
Silt carried by Gila River.....	90-92
Silt rolled along the bottom.....	90
Silt that would accumulate in San Carlos Reservoir.....	93
Most suitable height of dam.....	115
Safe yearly water supply from San Carlos Reservoir.....	105-106
Reservoir capacity required for water storage.....	105
Reservoir capacity required for silt storage.....	107-115
Raising dam to postpone desilting.....	113
Life of reservoir without desilting.....	108, 111, 115
Behavior of reservoir formed by dam 180 feet high.....	116-118
This reservoir compared with Engle (Elephant Butte) Reservoir.....	119
Flowage damage to San Carlos Indian Reservation.....	120-122
Flowage damage to Arizona Eastern Railroad.....	123-125
Desilting, necessity of.....	126
Desilting—	
By sluicing.....	127
By lateral canal.....	128
By conduit on bed of reservoir.....	129
Quinton's method.....	130
By dredge.....	131-132
Power for, and for other purposes, from San Carlos Dam.....	133
Gila River between impounding and diversion dams as an irrigation conduit..	134
San Pedro River.....	135

	Paragraphs.
Diversion dam.....	136-138
Duty of water.....	139-142
Area of Indian, public, and private lands to be taken into project—Canal system.....	143-166
Public lands.....	143
Indian lands.....	144-147. 153
Private lands.....	148-153
Distribution of cost between Indian and private lands.....	153
Locality to which San Carlos water should be confined.....	155
Quality of lands and waters.....	156
Tenders of private lands.....	157
Well water, use of.....	158-159
Canals, main, and Pima and Picacho branches.....	160-166
Canals, lining.....	163-165
Estimate of cost of project.....	167-181
For Indian lands.....	170-175
For private lands.....	176-181
Rights and claims to Gila River waters.....	182-188
Bearing of prior rights on advisability of project.....	184-185
Conditions to be met by entrymen under project.....	187-188
Alternative projects.....	189-201
Storage project for Indians alone prohibitively expensive.....	189
Flood-water and pumping project for Indians more expensive than San Carlos storage project.....	190-191
Flood-water project, without pumping or storage, for Indians alone.....	198-200
Effect of such project on irrigation near Florence.....	200
Possible rights below Pima Reservation.....	201
Practicability of project.....	202
Uncertainties as to water supply legally available.....	205-206
Advisability, factors in.....	207
Advisability of project—	
For private lands.....	207-211
For Indian lands.....	212-216
Recommendations.....	217

APPENDICES.

- A. Reports, etc., consulted.
- B. Box Canyon and dam sites.
- C. Log of drilling at San Carlos dam site, 1913.
- D. Type and design of dam, etc.
- E. Evaporation from reservoir.
- F. Run-off of Gila River at San Carlos, Ariz.
- G. Silt that would be deposited in San Carlos Reservoir.
- H. Flowage damage to San Carlos Agency.
- I. Silt disposal.
- J. Gila River between impounding dam and diversion dam as an irrigation conduit.
- K. Letter of Prof. Forbes on quality of land and waters in Florence-Casa Grande district.

LETTER OF TRANSMITTAL.

WAR DEPARTMENT,
Washington, February 24, 1914.

TO THE SPEAKER, HOUSE OF REPRESENTATIVES,
Washington, D. C.

SIR: Section 2 of the act approved August 24, 1912, making appropriations for the current and contingent expenses of the Bureau of Indian Affairs, provides as follows:

That the Secretary of War be, and he hereby is, directed to convene a board of not less than three engineers of the Army of wide reputation and large experience to make the necessary examinations, borings, and surveys for the purpose of determining the reasonability and practicability of constructing a dam and reservoir at or in the vicinity of the Box Canyon, on the San Carlos Indian Reservation, known as the site of the proposed San Carlos Reservoir on the Gila River, Arizona, and the necessary irrigation works in connection therewith to provide for the irrigation of Indian, private, and public lands in the Gila River Valley. Such board of engineers to submit to Congress the results of their examinations and surveys, together with an estimate of cost, with their recommendations thereon, at the earliest practicable date.

In accordance with that provision of law a board of engineer officers, including Lieut. Cols. W. C. Langfitt and C. H. McKinstry and Maj. Harry Burgess, was appointed September 19, 1912. The report of the board dated February 14, 1914, accompanied by photographs and drawings pertaining thereto and furnishing the information required by the act is submitted to Congress herewith.

Very respectfully,

LINDLEY M. GARRISON,
Secretary of War.

SAN CARLOS IRRIGATION PROJECT, ARIZONA.

BOARD OF ENGINEER OFFICERS,
Los Angeles, Cal., February 14, 1914.

From: Board of engineer officers.

To: The honorable the Secretary of War (through the Chief of Engineers, United States Army.

Subject: Report on "San Carlos irrigation project," under Indian appropriation act of August 24, 1912.

APPROPRIATION ACT, ORDERS, ETC.

1. This is the report of the board appointed by Special Orders, No. 23, Office of the Chief of Engineers, September 19, 1912, as follows:

By authority of the Secretary of War, and in pursuance of the directions of Congress in the act of August 24, 1912, making appropriations for the Bureau of Indian Affairs, a board of officers of the Corps of Engineers, to consist of Lieut. Col. William C. Langfitt, Lieut. Col. Charles H. McKinstry, Maj. Harry Burgess, is hereby appointed to make the necessary examinations, borings, and surveys for the purpose of determining the reasonability and practicability of constructing a dam and reservoir at or in the vicinity of the Box Canyon, on the San Carlos Indian Reservation, known as the site of the proposed San Carlos Reservoir, on the Gila River, Ariz., and the necessary irrigation works in connection therewith to provide for the irrigation of Indian, private, and public lands in the Gila River Valley, and to report thereon, as required by section 2 of the aforesaid act.

The board will assemble at Phoenix, Ariz., at a time to be designated by the senior member, and is authorized to visit such other points as it deems necessary for the proper performance of its duties.

Upon the completion of the duty assigned them the members of the board will return to their proper stations.

Lieut. Col. Charles H. McKinstry, Corps of Engineers, will act as executive and disbursing officer of the board.

2. The item in the Indian appropriation act of August 24, 1912, reads as follows:

* * * That the Secretary of War be, and he hereby is, directed to convene a board of not less than three engineers of the Army of wide reputation and large experience to make the necessary examinations, borings, and surveys for the purpose of determining the reasonability and practicability of constructing a dam and reservoir at or in the vicinity of the Box Canyon, on the San Carlos Indian Reservation, known as the site of the proposed San Carlos Reservoir on the Gila River, Arizona, and the necessary irrigation works in connection therewith to provide for the irrigation of Indian, private, and public lands in the Gila River Valley. Said board of engineers to submit to Congress the results of their examinations and surveys, together with an estimate of cost, with their recommendations thereon, at the earliest practicable date. The sum of \$15,000, or so much thereof as may be necessary, is hereby appropriated, out of any money in the Treasury not otherwise appropriated, for the purpose of conducting said investigations.

3. Ten thousand dollars additional was appropriated by the Indian appropriation act of June 28, 1913.

4. The board met at Phoenix, Ariz., 10 a. m., November 12, 1912; and on the 13th proceeded to the Chandler Ranch, the new Santan

Ditch, and the Sacaton (Pima Indian) Agency. On the 13th, 14th, and 15th the board inspected Indian and private lands irrigable under the San Carlos project. On the evening of the 14th the board attended a meeting of the principal men of the Pima Nation, who had been called together by the school superintendent, Mr. Thackery, at which meeting several of the Indians and Dr. Cook—long time a missionary among the Pimas—made addresses in favor of having the United States build the San Carlos Dam. On the 15th the board held a public hearing at Florence, at which a large number of owners of land irrigable under the San Carlos project were present and expressed themselves with one or two exceptions as in favor of the United States building the dam. On the 15th and 16th the board proceeded to San Carlos via the Roosevelt Dam and Globe. At Globe the board held a public hearing, at which several persons addressed the board in opposition to the San Carlos project and in favor of allowing the railroad to build at a low elevation through the box canyon of the Gila and the proposed dam site. On the 17th the board inspected the box canyon as far down as the 1899 dam site and selected a locality about 1,000 feet upstream therefrom as a site to be investigated. On the 17th and 18th the board returned to Phoenix, and on the 18th and 19th studied such data from the files of the United States Reclamation Office as were immediately available and drew up a program of work to be carried out by the executive officer.

5. While at Phoenix the board was in frequent consultation with Mr. L. C. Hill, supervising engineer, United States Reclamation Service, and Mr. Howard S. Reed, engineer in charge of operation and maintenance, Salt River project, both of whom are familiar with the San Carlos project and with the general subject of irrigation in Arizona and elsewhere.

6. On March 27, 1913, the executive officer held a public hearing at Florence, at which the work done by the board up to that time was explained and the owners of lands irrigable under the San Carlos project were invited to inform the board whether or not they would care to enter their lands under the project in case the United States should undertake it, how much per acre their lands could afford to pay, and how much they would be willing to pay for water under the project.

7. On June 4, 5, and 6 the board held meetings in Washington, at which the board's engineer, Mr. D. E. Hughes, was also present. At these meetings the board considered the data that had been collected up to that time by the executive officer and the engineer and drew up a final program of work.

8. The executive officer visited the dam site on September 30 and October 1, 1913.

9. The third and last meeting of the board was held November 10–15, 1913. On the 10th the board met at San Carlos, and on the 11th made a detailed inspection of the upper and lower dam sites and of the results of the diamond-drill borings. On the 12th and 13th the board proceeded to Los Angeles, Cal., and at its sessions of the 13th, 14th, and 15th completed its findings and agreed upon the substance of its report.

10. In all of its work the board has been greatly assisted by its engineer, Mr. D. E. Hughes, member American Society of Civil

Engineers. Attention is invited to Mr. Hughes's memoranda on various elements of the project, found in the appendixes, especially to those on the "Design of the dam" and "Silt."

11. The diamond-drill borings at the dam site were under the immediate charge of Mr. W. E. Jones, to whose experience and energy the board is indebted for the thoroughness and success with which that work was done.

12. Early in the investigation Mr. F. H. Newell, Director of the United States Reclamation Service, offered to furnish the board all data relating to the San Carlos project on file in the Washington, Phoenix, and Los Angeles offices of the Reclamation Service, and a considerable amount of unpublished records have been turned over to it. Presumably the board has had before it everything of importance, published or unpublished, relating to the project.

13. This opportunity is taken to acknowledge the courtesy of the reclamation officials with whom the duty of the board has brought it in contact, and the valuable assistance received from Mr. Hill.

THE SAN CARLOS PROJECT.

14. The Gila River is the most southerly of the large tributaries of the Colorado River. It rises in western and southwestern New Mexico, receiving its waters from mountains having an elevation of from 7,000 to 8,000 feet. Flowing in a general southwesterly direction, it enters Arizona in about latitude $32^{\circ} 40'$ north, at an elevation of about 6,000 feet, and flows across the State in a general westerly direction, emptying into the Colorado River near Yuma. In New Mexico its watershed is generally a high rolling plateau, through which the river flows in a deep canyon. About 10 miles before reaching the Arizona line the canyon broadens into a valley of considerable width, known as Duncan Valley. In this valley some 7,000 acres of land are being irrigated from the river. About 13 miles below Duncan the river is crossed by a lava ridge, through which the river has cut a gorge known locally as York Canyon. Below York Canyon the valley broadens again, and then gradually narrows by the closing in of the long stony ridges, which extend from the higher mesas. At Guthrie, at the crossing of the road from Solomonville to Clifton, the valley is perhaps 300 or 400 yards wide. Five miles below Guthrie the Gila receives the waters of the San Francisco. From about 2 miles below Guthrie the river flows in a canyon for a distance of about 20 miles, or to within 10 miles of Solomonville.

15. The Solomonville Valley extends from a point 10 miles above Solomonville to the Box Canyon, 7 miles below San Carlos, a distance of 70 miles. Between Solomonville and Geronimo about 25,000 acres are under irrigation. Below Geronimo is the San Carlos Indian Reservation. About 1,200 acres in the main valley and in the valley of the San Carlos River, which flows into the Gila at San Carlos, are irrigated by the Apache Indians.

16. The Arizona Eastern Railroad (Bowie to Globe) crosses the Gila Valley at San Carlos.

17. The Box Canyon of the Gila extends from a point about 7 miles below San Carlos to the mouth of the San Pedro River, a distance of about $31\frac{1}{2}$ miles. The dam site is close to the upper end of the canyon. The country to the north and south of the canyon is

rough and mountainous, the elevation varying from 3,000 to 5,000 feet. Pinal Mountain, the highest peak to the north, reaches an elevation of 8,000 feet. From the mouth of the San Pedro to the Buttes (36 miles) the river flows through about 20 miles of valley lands and 16 miles of canyon. Four miles below the Buttes and about 10 miles above Florence are several practicable sites, one better than the others, for a diversion dam. Shortly below the diversion-dam site the river emerges upon the plains at an elevation of about 1,500 feet above the sea. About $7\frac{1}{2}$ miles below Florence is the east boundary of the Gila River Indian Reservation, which extends along the river for a distance of about $52\frac{1}{2}$ miles. The Sacaton Agency is about $21\frac{1}{2}$ miles below Florence. Some 15,000 acres are under irrigation by the Pimas at the present time.

18. Above the Gila River Indian Reservation the principal tributaries of the Gila, proceeding downstream, are the San Francisco, which rises in westerly New Mexico, among mountains reaching the elevation of 10,000 feet, and joins the Gila a few miles west of the New Mexico-Arizona line; the San Simon, an intermittent stream which rises in southeastern Arizona and joins the Gila near Solomonville; the San Carlos, an intermittent stream, which, flowing from the north, enters the Gila at San Carlos; and the San Pedro, also an intermittent stream, which rises in Mexico and joins the Gila near Dudleyville. The Salt River, which, with its important tributary, the Verde, rises in central and east central Arizona, joins the Gila near Phoenix a few miles below the reservation. The Salt and the San Francisco are the largest tributaries of the Gila.

19. The proposed San Carlos project includes an impounding dam across the Gila River in the Box Canyon at a point about 7 miles below San Carlos, a diversion dam across the Gila at a point about 10 miles above Florence, and a main canal or canals from that point to the lands southwest of Florence and to the Pima Indian Reservation. (See Maps Nos. 1 and 2.)

20. The distance from the site of the impounding dam to that of the diversion dam is about 70 miles. From this point to Florence is about 10 miles and to Sacaton $31\frac{1}{2}$ miles. The site of the impounding dam is about 31 miles above, and the site of the diversion dam about 39 miles below, the mouth of the San Pedro River.

21. The Gila River Indian Reservation contains about 360,000 acres. Mr. C. R. Olberg, superintendent of irrigation, in his report of September, 1913, divides this area approximately into the following classes of land:

Land cultivated or formerly cultivated.....	44, 900
Additional irrigable area.....	70, 080
Level land, largely alkaline or swampy.....	37, 375
Fertile highland, suitable for grazing.....	96, 445
Mountainous land.....	99, 000
River bed.....	12, 200

Total.....	360, 000
------------	----------

22. The area lying under a canal having its heading at a diversion dam located as mentioned above, and lying north of the Southern Pacific Railroad track and east of the Pima Reservation and the Sacaton Mountains, is about 200 square miles. South of the Southern Pacific track is a contiguous area of perhaps as much more that could be irrigated from such a canal were sufficient water available.

PRIOR INVESTIGATIONS.

23. The investigation of the question of water storage in the Gila watershed grew out of the fact that by 1896 the diversion of water from the Gila by white settlers above the Gila Indian Reservation had deprived the Pimas of much of their customary supply of water and reduced this nation, till then self-supporting, to dependence upon national charity. "The occasion of this investigation (that of 1896) lies in the necessity of promptly providing water for use in agriculture on this (the Gila Indian) reservation. The Indians here located have from time immemorial been self-supporting. They have carried on irrigation for centuries by means of water taken from the Gila River. * * * For a number of years the United States has been and still is rapidly disposing of the land along the river, it being well known that these lands have no value unless water is taken from the stream, and it has been equally apparent that by this action the Indians would be pauperized by being deprived of their only means of support. Public attention has been called to this matter from time to time. * * * Meanwhile it is asserted that the Indians, learning to depend upon the Government for food and clothing, have been rapidly losing their capabilities for self-support and are becoming a permanent charge and source of annual expense. If they are to be kept from further degradation it is necessary that prompt action be taken toward enabling them to practice some means of self-support. This is possible only by securing to them the means of obtaining an ample supply of water."¹

24. The United States has continued to dispose of land irrigable under the San Carlos project until practically all the land in the Florence-Casa Grande district, except certain small tracts inferior in quality, is either patented or filed on.

25. A list of the more important reports, etc., relating to the San Carlos project, is given in Appendix A.

26. A brief outline of the history of the project will be sufficient for the purposes of this report.

27. *Report of J. B. Lippincott, 1899.*—The first description of the San Carlos project is found in the able report of J. B. Lippincott published in Water-Supply Paper No. 33 (1899), in which the construction of the dam was recommended.

28. *Report of J. D. Schuyler, 1900.*—Mr. J. D. Schuyler, consulting engineer, reviewed Lippincott's report and indorsed its conclusions (S. Doc. No. 152, 56th Cong., 1st sess.).

29. *Investigation of 1903.*—The Second Annual Report of the Reclamation Service (1902-3) states:

* * * Everything considered, the San Carlos site was by far the best discovered on Gila River, but the investigations of foundations were incomplete, only two holes being sunk to bedrock, and one of these being near the edge of the canyon. The bedrock problem is very important at this point, as there is a fault in the strata almost directly across the canyon at the dam site, and it became necessary to locate the dam either above or below the narrowest part of the gorge in order to avoid this fault.

Investigations of the foundation problem were begun by the Reclamation Service in February, 1903. The steam diamond drill and pipe apparatus were placed in charge of W. G. Steward, under the general direction of C. R. Olberg. The work was

¹ Letter of F. H. Newell, hydrographer, to the Director of the Geological Survey, dated Nov. 11, 1896, transmitting report of Mr. Arthur P. Davis on "Irrigation investigation for the benefit of the Pima and other Indians on the Gila River Indian Reservation, Ariz." (S. Doc. No. 27, 54th Cong., 2d sess.)

discontinued in August, 15 holes having been sunk to bedrock and diamond drill cores being taken therefrom. These are shown in figure 2 and Plate XI.

The general result shows that the depth to bedrock is somewhat less above the fault than below it, and this fact, together with the general desirability of leaving the fault entirely out of the reservoir, pointed to the location above the fault as a more feasible position for a high dam.

Final conclusions with reference to this project have not been reached, but the result of borings shows that the foundation difficulties are not by any means insuperable.

Two other problems are, however, involved in this storage project which are of a very serious nature. The quantity of sediment carried by Gila River is very large; and while it is believed that this problem can be solved, it must be admitted that no plan has yet been submitted which meets with the general approval of experienced engineers. The plan proposed for this purpose by Mr. Davis is published in the First Annual Report of the Reclamation Service, page 83.

For properly carrying out this plan or any similar one it will be necessary to find some auxiliary storage on the upper waters of Gila River. There is now no steady flow to depend upon for sluicing out the reservoir or for serving the lands below during the process. At present no such site is known except at York Canyon. The treacherous nature of the abutments for the dam and the great expense caused by removal of the large amount of railroad make the construction of a dam at this point of doubtful feasibility. Incomplete reconnaissance of the upper basin made by Cyrus C. Babb in 1899 failed to reveal any feasible site. It is proposed to continue this reconnaissance the coming year.

Still more serious than the sediment problem is that of the water supply. Since previous investigations were made there has been a progressive decrease in the flow of water past San Carlos, due probably to more complete diversion of Gila waters in the neighborhood of Solomonville, in Graham County.

The total discharge for the year 1902 was less than 100,000 acre-feet, and the total discharge for the year 1901 less than 200,000 acre-feet. In fact, no year has occurred since 1897 when a reservoir of the proposed dimensions would have been filled at this point. It is conceded that the last four years have been abnormally low in their small water supply, but such years may occur again, and must be reckoned with. A reservoir of large capacity must be constructed in order to utilize the flow of wet years to supplement those of minimum supply and to provide for the immense silt deposits. It is advisable, therefore, in order to consider this phase of the subject, to make surveys for a higher dam and a larger reservoir than heretofore contemplated and, if possible, to find auxiliary storage in the upper part of the basin.

In addition to these complications, the water supply data indicate that under the exacting requirements of irrigation in the hot climate of Arizona it will not be possible to irrigate from this reservoir as large an area of land as heretofore contemplated.

The drawings referred to in the above extract of the report are incorporated in drawings herewith.

30. Following the publication of Water Supply Paper No. 33 and the passage of the reclamation act, an effort was made by the white settlers near Florence to have the San Carlos project carried out as a national reclamation project. When the Salt River project was adopted and the San Carlos project failed of adoption the disappointment was keen.

31. *Report of board of United States Reclamation Service engineers, 1905.*— Under date of December 7, 1905, the following report on the San Carlos project was submitted to Mr. F. H. Newell, then Chief Engineer of the United States Reclamation Service:

In compliance with your instructions, the board of engineers designated to consider the San Carlos project have carefully considered all of the available data bearing upon the matter, and have to report as follows:

A reservoir of sufficient capacity at San Carlos to store 300,000 acre-feet of water will require a dam 140 feet high, and, in view of the large amount of sediment carried by the flood waters of the Gila River, the dam would have to be 180 feet high to maintain such a capacity for a period of 60 years, as the silt deposited in the reservoir would amount to about 7,500 acre-feet yearly.

The topography of the country around the proposed reservoir is of such a nature that it will not be financially feasible to construct canals around the reservoir for flushing purposes.

Borings in the bed of the San Carlos River at the dam site indicate that the bedrock on which the dam will have to be founded is about 60 feet below the low-water level of the stream, making the structure very expensive for the length of time that it can be expected to serve a useful purpose. The dip of the bedrock at the site of San Carlos Dam is in the direction of flow, and may be a dangerous formation on which to found the structure.

During the years 1904 and 1905 observations and investigations made upon the upper tributaries of the Gila and San Francisco Rivers in New Mexico indicate that reservoirs can be constructed upon these streams of sufficient capacity, in connection with the natural flow of the Gila River to irrigate 40,000 acres, at less cost per acre than by constructing the San Carlos dam.

The San Carlos reservoir site is already occupied by the Gila Valley, Globe & Northern Railway, and the Southern Pacific Railway Co. has located a line through the canyon for its main transcontinental line. Estimates for the cost of this line for an elevation of about 40 feet and 150 feet above the river bed show a difference of \$2,773,000 in favor of the lower location.

The officials of the Southern Pacific Railway Co. state that if the Reclamation Service will abandon the San Carlos dam site the railway company will withdraw application for right of way through reservoir site on San Francisco River, and will gladly make any concessions that they consistently can, in other localities.

In view of the above-mentioned facts and conditions we recommend that the dam and reservoir site at San Carlos be abandoned, and that the lands be restored to entry.

We also recommend that observations for stream discharge be continued on the upper Gila and San Francisco Rivers.

A plate showing the area, capacity, and useful life of the reservoir for different heights of dam is transmitted herewith.

The resolutions of the directors of the Southern Pacific Railway Co., withdrawing application for right of way through the San Francisco River reservoir site, will be transmitted as soon as received.

Respectfully submitted.

A. P. DAVIS,
GEO. Y. WISNER,
W. H. SANDERS,
LOUIS C. HILL,
A. E. CHANDLER,
Board of Engineers.

32. The only information which this board has concerning reservoir sites on the Upper Gila and the San Francisco referred to in the above report is contained in Water Supply Paper No. 33 and in report of W. A. Farish to L. C. Hill, supervising engineer, United States Reclamation Service, dated September 3, 1904. The Guthrie site on the Upper Gila is discussed in Water Supply Paper No. 33, pages 77-78. A dam 140 feet high there would impound 255,800 acre-feet. At the Red Rock site on the Upper Gila Mr. Farish reports that a dam 100 feet high would impound 80,000 acre-feet. He reports on four sites on the San Francisco, of which only the Alma site has storage capacity reasonably commensurate with the height of dam—a dam 150 feet high impounding 135,000 acre-feet. River gaugings made subsequent to Mr. Farish's reconnaissance indicate that the run-off at Alma is less than one-third that at San Carlos. Information as to the character of the foundations at the various sites is too meager to permit estimates of the cost of dams to be made.

33. It is possible that reservoirs on the upper tributaries may serve some useful purpose in the future, either to delay the date when desilting will be necessary in the San Carlos Reservoir, or to reduce the amount of material to be removed annually therefrom, or to take the place of the San Carlos Reservoir if that should be allowed to become filled with silt. But for the purpose of supplying stored water to the Pima Indians or to private lands near Florence and Casa Grande, reservoirs on the upper tributaries would be inferior to a reservoir on the main stream at San Carlos.

34. In 1906 the Arizona Eastern Railroad Co. was granted a right of way through the reservation and the dam and reservoir sites. This right expired by limitation early in 1909. Later in 1909 the railroad company filed a new application (under the act of Mar. 2, 1899); and in the same year Julius M. Jamison applied for the right to construct the San Carlos dam and reservoir (under the act of Mar. 3, 1891, as amended by the act of May 11, 1898).

35. The briefs submitted to the Secretary of the Interior by the rival applicants, and the reports submitted by the applicants' engineers, review in detail the history of the San Carlos investigation and the advantages and disadvantages of the project in the light of the data then available. The decision of the Secretary of the Interior, dated February 17, 1912, rejects the application of the Arizona Eastern Railroad Co. for the reasons that "* * * construction of the road as contemplated would prevent use of the canyon for reservoir purposes and that it is practicable to construct the railroad at a higher grade without interfering with the reservoir site," and holds that "An application for a reservoir site should be accompanied by a showing reasonably demonstrating the feasibility of the contemplated irrigation scheme and the capability of the applicant to carry the project to a successful conclusion." As the decision contains an able summing up of the claims of the applicants, it is quoted in full below:

DECISION OF THE SECRETARY OF THE INTERIOR, 1912.

The so-called San Carlos Reservoir site is located on the Gila River in the White Mountain, or San Carlos, Indian Reservation, in Gila County, Ariz., near the junction of the San Carlos and Gila Rivers. The Gila River at this point traverses spurs of the Pinal Range of mountains and for a distance of about 30 miles below the proposed reservoir site flows in a narrow "box" canyon. Explorations on the Gila by hydrographers of the Geological Survey, in 1899, resulted in the location of what was believed to be a suitable site for a dam and reservoir for the purpose of storing the waters of the Gila River for irrigation of lands in its valley, including part of the lands occupied by Pima and other Indians some miles below.

In 1905 a board of engineers of the United States Reclamation Service examined the site with a view of determining whether or not it should be utilized for a reclamation project under the act of June 17, 1902 (32 Stat., 388), and recommended that the project be not undertaken by the Reclamation Service.

April 13, 1906, the Arizona Eastern Railroad Co. filed an application for right of way through the San Carlos Indian Reservation and through the reservoir site in question under the provisions of the act of March 2, 1899 (30 Stat., 990), which application was approved by this department. No construction has been made under this approval and the period within which such construction should have been made has already expired. August 3, 1909, the company filed a new application for a right of way through said reservation and reservoir site, which application is now up for consideration.

December 17, 1909, J. M. Jamison filed application for right of way for a reservoir site under the provisions of the act of March 3, 1891 (26 Stat., 1095), as amended by the act of May 11, 1898 (30 Stat., 404), which application covers the so-called San Carlos Reservoir site, conflicts with the pending application for right of way of the Arizona Eastern Railroad Co., and also covers a part of the constructed line of the Arizona Eastern Railroad Co., which leaves the main line of the Southern Pacific Railroad Co. at Bowie and extends in a northwesterly direction through the reservoir site and terminates at Miami, a town located in the Globe mining district.

The Casa Grande Valley Water Users' Association, a corporation formed under the laws of the Territory of Arizona and composed of certain landowners whose lands would be subject to irrigation from the reservoir site, and the Gila River Water Co., an Arizona corporation, have also filed applications for rights of way for said reservoir site under the provisions of the acts of 1891 and 1898, *supra*.

Various resolutions adopted by the boards of trade of cities and towns in the vicinity, and by the inhabitants or land owners of the Gila Valley, have been filed in the de-

partment, all urging the rejection of the railroad right of way application and the preservation of the reservoir site for development and use in the irrigation of arid lands in the Gila Valley. The several applicants for the right to use the reservoir site for irrigation purposes appear to be at cross purposes with one another, but all unite in opposing the railroad application, urging that the construction of a railroad upon the level proposed in said application will forever defeat and prevent the use of this reservoir site for the reclamation of arid lands. The United States is especially interested, because of its guardianship over the Pima and other tribes of Indians domiciled on lands which might be irrigated in part, lying below the proposed dam.

Because of the large and varied interests involved I made a personal inspection of the premises, in company with Director F. H. Newell, Reclamation Service; Mr. W. H. Rosecrans, consulting engineer in irrigation matters connected with the Indian Service; James D. Schuyler, consulting engineer; and other engineers and representatives of interested parties, and also accorded a public hearing on the several pending applications, at which all parties were represented and participated in oral argument, and upon the entire record thus supplemented the matter has received careful consideration.

It is contended on behalf of the railroad company that the refusal of its application will result in the abandonment of a proposed short transcontinental line of lower grade than any other existing line, the construction of which would afford the shippers lower rates and more expeditious handling of freight between the East and West, and, incidentally, through the construction of branch lines, supply the Salt River Valley, now irrigable under the Roosevelt Dam, the Globe mining district, and southwestern Colorado, with cheap transportation facilities, cheap fuel, and easy outlet for crops, minerals, and other commodities.

It is contended by the reservoir applicants that a "high-line" location of the railroad, so placed as to avoid any interference with the utilization of the reservoir site, is entirely feasible, and can be constructed and operated at a comparatively small increase in cost over a railroad upon the right of way applied for. Such a "high line" has been surveyed by an engineer employed by reservoir applicants, but the findings of this engineer are controverted by the engineers of the company who contend that the additional cost of construction and operating the so-called high line will be prohibitive, and state that unless its application for right of way as applied for is approved the railroad will be compelled to abandon its purpose to construct through Gila Canyon.

A number of examinations of the proposed reservoir and dam site have been made by engineers in the Government service and by engineers in the employ of private parties, and their reports as to the feasibility of the utilization of the site, the cost of construction, the available supply of water for storage therein, and the possibility of disposing of the accumulation of silt carried in the waters of the Gila differ quite materially. The reports also differ widely as to the amount of land which could be reclaimed through the construction of the proposed dam, but there is no doubt that there is a sufficient supply of water in the Gila available for storage and a sufficient area of fertile arid lands susceptible of irrigation from the reservoir to justify the utilization of the site if it be determined that a suitable foundation is present for the construction of a high dam which will create a reservoir of sufficient capacity to impound the flood waters of the Gila, and if a method of disposing of the silt carried in the water can be successfully worked out and the cost is not prohibitive. The project is, however, of such magnitude and involves such problems as to require that anyone undertaking the construction and utilization of the reservoir be assured of ample funds to carry the project to a successful conclusion. In the interest of the landowners, who must ultimately bear the burden of expense involved in the construction of any such project, the financial and engineering features of the project should be carefully worked out and assured before this department will be warranted in granting the use of the site.

Reservoir sites wherein it is feasible or may be practicable to store the waters of the Gila for the irrigation of arid lands in its valley are not numerous, and it seems to be the opinion of many engineers of high standing that the San Carlos site is the best adapted to the purpose. A railroad constructed through the reservoir site upon the grade applied for by the Arizona Eastern would practically destroy the future use of this site for irrigation, and the department is by no means convinced that the additional cost of building and maintaining the railroad on a higher level, so as to avoid interference with the reservoir site, would make the construction of the railroad impracticable. Certainly the railroad should not be permitted to destroy the possibilities incident to the irrigation of the arid lands in the valley, including Indian lands, and the resulting agricultural prosperity of that portion of Arizona from which the railroad itself will ultimately derive a substantial benefit, especially where a change in the location of its line is reasonably possible.

Accordingly, and in view of the foregoing, the application for right of way filed by the Arizona Eastern Railroad Co., August 3, 1909, is hereby rejected because of its interference with the San Carlos reservoir site, but this rejection will not preclude the railroad company from presenting another application for right of way for its road along the Gila at such an elevation as will avoid interference with the reservoir site.

As hereinbefore indicated, there is no unanimity among the applicants for the right to use the reservoir site as the basis for an irrigation project. Jamison and the Gila River Water Co. approach the proposition as promoters or as persons whose interest lies in the profit to be derived from the sale of water rights to owners of land under the project. The water users' associations mentioned, apparently composed wholly of land owners, desire to secure an adequate and permanent supply of water for the irrigation of their arid lands, do not expect to derive a profit from the sale of water rights, but expect to reap a benefit from the water supply and the increased value of their lands when reclaimed from their arid condition. None of said applicants have, however, satisfactorily demonstrated to this department that they have made such investigation as demonstrates the feasibility of their plans either from an engineering or financial standpoint, nor that they control sufficient funds to successfully construct and operate the project if the right of way were granted.

Upon the present record, therefore, the several applications for rights of way for the reservoir site are accordingly hereby rejected without prejudice to the right of said applicants, or any one of them, to hereafter submit a new application, supported by such showing as shall reasonably demonstrate the feasibility of the scheme and the capability of the applicants to carry the project to a successful conclusion.

SAMUEL ADAMS,
First Assistant Secretary.

36. Brief reference will be made to certain reports which were before the Secretary of the Interior at the time this decision was made, or were prepared subsequently.

37. *Report of M. O. Leighton, 1910.*—Under date of February 8, 1910, Mr. M. O. Leighton, chief hydrographer, United States Geological Survey, submitted a report on the feasibility of the San Carlos project, and the relative importance of the use of the reservoir site for a reservoir or by the railroad. This report treats chiefly of the question of water supply, and expresses the conclusion that "the project should not be planned on the basis of a greater actually cultivated acreage than the equivalent of the average of the five dry years (1900–1904). The average was 140,200 acre-feet, sufficient on the basis of 4.355 acre-feet per acre (at the dam; 3 feet at the land) to properly irrigate about 32,200 acres. If we allow a margin for nonproductive land of 25 per cent we have a project of 43,000 acres, which represents all that is really warranted under the records at hand." Mr. Leighton recommended that the railroad be permitted to build through the dam site on the low line. Mr. Leighton's position in regard to the hold-over storage of water and the basis on which it is advisable to enter upon an irrigation project is not supported by the board's investigations.

38. *Report of F. E. Herrmann.*—The report of F. E. Herrmann in support of the railroad's application unduly emphasizes the difficulties and minimizes the advantages of the San Carlos project. He concludes that with a duty of 4 feet per acre, 6 feet will be required at the point of diversion and $7\frac{1}{2}$ feet at the dam; that the safe annual supply is but 166,000 acre-feet, and that accordingly "there may be reliably irrigated from the San Carlos reservoir about 24,000 acres of land near Florence."

39. *Reports of J. H. Quinton.*—Mr. Quinton, in his report of September 11, 1909, assumed 260,000 acre-feet of water as the annual supply that could be drawn from the San Carlos Reservoir, and estimated that with a loss of 25 per cent in transmission and a duty of

3 feet at the land, 65,000 acres could be irrigated, or allowing for waste land, 100,000 acres.

40. He realized that the reservoir formed by a dam of the height he was considering—150 feet above the stream bed—would soon have its capacity seriously reduced by silt. As to the quantity of silt carried, he had only Davis's estimate of 6,000 acre-feet (U. S. R. S., 1st A. R., p. 85) and the estimate of the 1905 board of Reclamation Service engineers, namely, 7,500 acre-feet. He assumed 5,000 acre-feet. Even with this assumption, the reservoir he was considering would be filled in 75 years and its usefulness impaired in 25 years. Realizing the necessity of desilting, Mr. Quinton prepared a plan, which is discussed elsewhere in this report, and under which he estimated that silt could be removed for 2 cents per cubic yard. For 100,000 acres of irrigated land this would make the charge for desilting \$1.60 per acre.

41. Mr. Quinton pointed out that the Gila River silt has high value as a fertilizer, and his report contains valuable information as to the agricultural possibilities of the land irrigable under the San Carlos project.

42. In a later report (Mar. 12, 1910) Mr. Quinton reviewed Mr. Leighton's report, referred to above, and revised his former estimate of water available and land that could be irrigated. He estimated that 46,000 acres of land could receive a full supply of 3 acre-feet of water per acre (at the land) and 50,000 acres additional could receive $1\frac{1}{2}$ acre-feet, $1\frac{1}{2}$ acre-feet being sufficient for one crop. Mr. Quinton also considerably increased his estimate of the cost of the project.

43. In a third report, dated September 3, 1912, submitted after the Secretary's decision, Mr. Quinton estimated the area irrigable from a reservoir formed by a dam 162 feet high at 50,000 acres. He assumed that the United States would require for the Indian lands stored water for one-third of that acreage, leaving 33,000 acres. He pointed out that there is known to be a copious supply of underground water under the Gila River Indian Reservation, and suggested that the possibility of obtaining water within reasonable pumping lift under the land near Florence be investigated.

44. *Report of J. D. Schuyler and H. Hawgood.*—Messrs. Schuyler and Hawgood, in a report dated September 27, 1910, controvert Leighton's statement that the "factor which determines the feasibility or nonfeasibility of an irrigation project is not the abundant but the scarce years of water supply." They point out that "if the annual water supply of dry seasons * * * be used as a criterion for the feasibility of irrigation projects in southern California there are few which would be able to show a sufficient supply to be considered as successful and safe irrigation projects," and that in the Gila Valley the water supply in dry years may be supplemented by pumping from the underground supply, which appears to be more than ordinarily abundant. They show that following Leighton's treatment of the San Carlos storage the Roosevelt Reservoir would have been empty for months at a time during the years 1901, 1902, 1903, and 1904. They expose errors in Leighton's estimate of cost, and finally point out that the figure he assumed for depth of evaporation from the reservoir, 91 inches, is too great.

45. *Report of J. D. Schuyler.*—Mr. Schuyler, in a report of September 28, 1910, dealt with the "injustice which may be done in perpetuity to the present population and future inhabitants of the Gila River Valley" by the granting of the right of way for a railroad through the dam and reservoir sites; with the disadvantages (on the score of less abundant water supply) of reservoir sites above San Carlos; and with the water power that might be developed at the dam for pumping or other purposes. He states that "it is feasible and practicable to take care of the silt and maintain the serviceability of the reservoir," but he does not suggest a means.

46. *Report of William H. Rosecrans.*—Mr. William H. Rosecrans, consulting engineer, was employed by the Interior Department to report on the issues raised by the applicants for the dam and reservoir sites. His report on "Reservoir site at San Carlos" is dated 1912. He believes the railroad company's estimate of \$680,190.94 as the cost of constructing a new line around the reservoir is ample; is unable to see any justice in the claim that the cost of operating the new line would be greater than that of the present line; and thinks that the railroad overestimates the cost of building through the box canyon on the high line, as compared with the cost of building on the low line. He recommended that the application of the railroad company for a right of way on the low line through the dam site be not granted, but that the railroad company be informed that application would be entertained for a right of way on the high line.

47. Mr. Rosecrans reported the 1899 dam-site location to be a poor one, because (1) depth to bedrock is too great, being about 78 feet; (2) a fault crosses the site; (3) the strata dip downstream. He adds that the quantity of silt carried by the Gila is so great that the reservoir would fill up in a short time, and desilting methods are too expensive to be practicable; and that "raising the dam is not feasible in this instance, as the dam will have to be built to the greatest practicable height in the first instance in order to impound sufficient water to begin to justify the expenditure. A point up the river a short distance from the present proposed location would make a feasible dam site where an absolutely safe structure could be built, although the cost of such a structure at the present value of irrigated land would be prohibitive."

48. Mr. Rosecrans discusses the question of available water supply and concludes that 9 years out of 10 there would be available from the San Carlos Reservoir 260,000 acre-feet. He allots 90,000 acre-feet to the Pima Indians; and after allowing for loss by evaporation from the reservoir, and by evaporation, seepage, etc., from the canals, and assuming a duty of 3 acre-feet, he arrives at 62,000 acres (gross) as the acreage that could be supplied if a private company should build the system. The cost of the project he estimated as about \$60 per acre for this acreage. He considers this prohibitive, apart from the fact that the reservoir would be filled up with silt in 50 years. He therefore concludes that a private company would find it impossible to finance this project, and he recommends that the applications of Jamison and the Florence-Casa Grande Water Users' Association be disapproved.

49. Mr. Rosecrans entertains the idea (similar to that expressed by Mr. Schuyler) that "the silt problem may be satisfactorily solved

within the next 10 years." On this account he recommends that the San Carlos Reservoir site be retained.

50. Under date of January 4, 1912, Mr. Rosecrans submitted a report on "Irrigation of the Pima Indian Reservation, Gila River Valley, Ariz." In this he described the combined flood-water and pumping system recently installed on the north side of the Gila opposite Sacaton. The flood ditch is 10 miles long and has a capacity of 400 second-feet. There are eight wells, each equipped with electric pump and capable of furnishing 6 second-feet per well. Connecting the wells is a ditch having a capacity of 80 second-feet; it is approximately parallel to the flood-water ditch and just below it.

51. Mr. Rosecrans estimates that 12,000 acres can be irrigated from the wells and flood water. The cost of operation of the plant he estimates at \$2 per acre per year, not including maintenance of the ditches.

52. This system was constructed with funds appropriated in the acts of—

Mar. 3, 1905 (33 Stat. L., 1081).....	\$50,000
June 21, 1905 (34 Stat. L., 333).....	250,000
Apr. 4, 1910 (36 Stat. L., 272).....	75,000
Mar. 3, 1911 (36 Stat. L., 1062).....	125,000
Total.....	500,000

53. The electric power for driving the pumps is obtained from the Salt River project.

54. *Report of J. D. Schuyler.*—Under date of December 5, 1911, Mr. J. D. Schuyler submitted a report on the "Water Supply and Proposed Irrigation Works of the Pinal Mutual Irrigation Co., of Florence, Ariz." The following extracts are made from that report:

* * * * *

PAST AND PRESENT.

The Pinal Mutual Water Co. was incorporated March 29, 1911, by the owners of land and water rights under the Florence canal, for the purpose of supplying themselves with water for irrigation, which they could no longer obtain from the Florence canal by reason of its financial and physical failure and collapse as an irrigation system. This they have undertaken to do by building a canal of improved gradient and dimensions, practically parallel with the Florence canal for 20 miles, beginning a half mile or so above the old Florence canal headgate, and some eight feet higher in elevation, by erecting a substantial diverting dam which will perform its functions at all times whenever there is water flowing.

* * * * *

The Florence canal is the largest ditch built by white settlers on public lands in the valley outside the Indian reservation. It was begun in 1887 by the Florence Canal & Land Co., who, after completing about 10 miles of canal at a cost of about \$60,000, sold their franchise and all rights and property to the Florence Canal Co., who finished it in 1888, a total distance of about 50 miles. On the McClellan wash, some 22 miles from the head, they built the long earth dam or dike across the wash which forms a reservoir of 1,800 acres area, and about 15,000 acre-feet capacity, which is known as the Picacho Reservoir. This work was paid for from the proceeds of bonds to the amount of \$300,000 sold at 70 cents on the dollar. This sum of \$210,000 realized was used to complete the canal and reservoir, the latter alone having cost \$125,000. From the head to the Picacho Reservoir, on McClellan wash, the canal was built on specifications calling for an excavation of 25 feet at the bottom, sides sloping 1:1, and having a center depth of 6½ feet, with an average fall of 2 feet per mile. Below the reservoir it was extended of smaller dimensions some 28 miles farther, crossing the Southern Pacific Railroad 12 miles from the reservoir.

Subsequently, on April 16, 1894, the bondholders organized a new corporation, called the Casa Grande Canal Co., for the sole purpose of handling the property, which

they were obliged to take under foreclosure, and assessed themselves \$40,000, of which \$32,000 was used in the construction of 1½ miles of new canal at the heading to improve the original faulty location.

It will be observed that while the water taken out of the Gila by the Florence canal in 1896 was a large quantity, it was really only 11 per cent of the total flow of the river during that period, which in 1896 was yielding an abundant supply.

About the time Mr. Davis's report was made (1896) the Indians began to complain of shortage of water caused by the inroads made upon their supply by the Florence canal, and the latter in turn began to experience a diminution of its normal supply by the diversions made by irrigation canals on the upper Gila River, above San Carlos, in Graham County. An extensive development has been made in that region, and several prosperous towns have been built on the upper Gila as the result of the irrigation of so large a territory, but this has been largely at the expense of the farmers of the Florence region, who, though deprived of their water and impoverished thereby, have had no recourse.

It is now far cheaper to build a new one than to attempt to clean out the old canal and restore its original capacity.

After the appearance of these reports (W. S. P. 33 and S. Doc. 152, 56th Cong., 1st sess.), the people of the Gila Valley naturally expected the Government to build the San Carlos Dam in the near future. And even after the passage of the reclamation act they had every reason to hope and expect that the San Carlos Dam would be chosen as the object of the first development work in Arizona by reason of the double purpose which its construction would serve, viz, the provision of water for the Indians and the reclamation of a large area of Government land. It was a keen disappointment, therefore, when the Roosevelt site was given preference, and the last hope of the valley for irrigation development under Government auspices apparently vanished, at least within any reasonably definite time. As time had gone on and the Arizona apportionment of public land funds available for construction has been exhausted and exceeded on the Roosevelt project, the construction of the San Carlos Dam and the valley canal system by the Reclamation Service has become more and more remote. In fact, the Government officials appear latterly to have sought a pretext for withdrawing their support from San Carlos and have even made a report favorable to the surrender of the canyon to the Southern Pacific to build a road through it on a low level, which would make the dam impossible to build.

The present status of affairs on the Gila is that the people of the valley are now seeking from the Interior Department of the Government the right to take the lands of the Apache Reservation at San Carlos for reservoir purposes, and the right to build a dam at the head of the Box Canyon high enough to store all the flood waters of the river, or as much of them as it may be feasible to impound. This question has been pending for several years, but it is likely to be decided in the near future, and I believe favorably to the irrigators.

The landowners who have organized the Pinal Mutual Irrigation Co. are fully in accord with the movement to organize an irrigation district and build the San Carlos Dam, and will participate in the cost of it; but while waiting for it have decided to attempt the irrigation of at least 12,000 and if possible 25,000 acres by building a new canal from the river, which, by future enlargement and extension can be made to serve for the entire valley irrigable under the larger San Carlos storage project. They are unable to secure water from the old Florence Canal, as the receiver has surrendered his charge and given up the struggle to keep even with the expenses of maintenance, and therefore in self-defense are compelled to build independently.

OUTLINE OF THE PROJECT.

The project of the Pinal Mutual Irrigation Co. as outlined by their chief engineer, Mr. Alfred C. Sieboth, consists primarily in building a low diversion dam across the river at a point where granite bedrock outcrops on both sides of the channel, at a location about 4,000 feet upstream from the head gate of the old Florence Canal. This dam is intended to be so substantially built as to withstand the floods of the Gila, and high enough to answer the purpose of a permanent diversion weir for the larger project. From this dam site a canal has been surveyed on a uniform grade of 2.64 feet per mile, or 5 feet in 10,000, for a distance of 18.38 miles, following practically parallel with the old Florence Canal and a little way above it.

55. Mr. Schuyler proposed a dam of the Indian type with a lift of 4 feet and with sand sluice close to the head gate. The head gates recommended were of the radial type. Estimated cost, including headworks and sluice, \$78,303.

As before stated it (the canal) will have a grade of 2.64 feet per mile, and carry a depth of 3.5 feet of water. With a bottom width of 16 feet and side slopes of 1 on 1 the grade will give it a mean velocity of about 2.7 feet per second, and a discharge capacity of 180 cusecs. The new canal should keep itself scoured clean and clear of sediment, because it will have a higher mean velocity than the Florence Canal ever had, even when carrying 50 per cent more water.

The canal was to be 20 miles long; estimated cost, \$113,270.

56. Mr. Schuyler figured on a duty of 5 acre-feet per acre at the heading.

Whenever it may be possible (as it doubtless will be in many years of full flow) to keep the new canal filled to its extreme capacity for 300 days of the year, it would be able to divert a total of 108,000 acre-feet per annum, and this would suffice for 21,600 acres net actually irrigated, or 29,000 acres gross supplied with water, the difference of 25 per cent representing the area which in almost every irrigated region is that occupied by roads, buildings, corrals, fallow land, dry pasturage, and unused corners here and there.

While such flush seasons may often occur, the years when the river is low or nearly dry during April, May, and June are of such frequent occurrence as to place a serious limitation on irrigation operations and practically compel the farmers under the system to confine their crops to grain alone rather than to general farming, including the growing of alfalfa, which a constant supply of water would permit. Wheat and barley if planted during the late fall or early winter are not usually affected by this shortage if they can be irrigated before it sets in. For example, Mr. Sieboth states that as the sum of several years' experience in farming under the Florence Canal, he thinks that grain crops can be fully matured on four irrigations of 0.4 feet each; the first application to be in November, the second in February, the third in March, and the fourth the latter part of April. This would be equivalent to 19 inches of rainfall, and that amount in the San Joaquin Valley would produce bumper crops. The estimate therefore seems reasonable. If we assume that the ditches are so well cared for that the loss by seepage and evaporation during these four months does not exceed an amount that would cover the land 5 inches deep, the total volume of water required would be 24,000 acre-feet for 12,000 acres, requiring an average flow of 100 cusecs for 120 days.

The record of discharge of the Gila, given in Table II, page 9, indicates that in 7 years out of 10 much more than this quantity was flowing and could be depended upon. In such years, therefore, the returns to be anticipated from grain crops on 12,000 acres alone would be sufficient to justify the proposed investment.

57. Mr. Schuyler devotes a considerable part of his report to a consideration of the probability of developing an auxiliary water supply by pumping. He figured on 10 pumping stations located along the south bank of the Gila at intervals of 500 feet, beginning at the Florence Bridge. Each would consist of two 15-inch wells with centrifugal pump run by electric motors. The estimated cost was \$130,000. Cost of operation was taken at about \$22,000 a year, including interest and depreciation. The delivery would be 10,000 acre-feet in 100 days, and the cost per acre-foot \$2.20.

I therefore feel that this means of securing an auxiliary supply should be thoroughly investigated by boring one or more wells and making such tests as will determine their probable yield.

SUMMARY OF CONCLUSIONS.

In the foregoing I have endeavored to present the principal facts bearing upon the feasibility of the project, and I feel that I am justified in the following summarized statement of general conclusions:

* * * * *

3. The lands of the district outlined on the accompanying map cover an area of about 54,600 acres, of which not less than 12,000 nor more than 25,000 acres are to be taken into the project.

4. The lands in the entire district are smooth, gently sloping, and composed of soil of great depth, generally a mellow sandy loam, well adapted to irrigation. In quality these lands can not be excelled. They are capable of raising five or six crops per annum under irrigation.

5. The value of the lands with a sufficient water supply to enable them to be irrigated throughout the year is conservatively estimated at \$200 to \$250 per acre. With a water supply for one crop each year they are worth \$75 to \$100 per acre.

6. The water supply available without storage is ample for safely maturing one crop annually in at least 7 years out of 10. * * *

7. By boring wells and installing pumps it may be possible to develop 50 cusecs for auxiliary supply in dry seasons, at a capital cost of \$130,000, and a total annual cost for pumping 10,000 acre-feet of \$22,000, assuming that the United States Government will furnish electric power at 0.5 cent per kilowatt hour.

8. It is feasible to build a safe diverting dam of the type used in India and Egypt for \$62,540 (net).

9. The canal projected and surveyed will carry 180 cubic feet per second on the grade and dimensions adopted.

10. The canal as projected can be built at a cost not to exceed \$118,820.

11. A storage reservoir on the upper Gila or the San Francisco River, in New Mexico, may possibly be a cheaper means of securing an auxiliary supply than wells and pumps, and should be investigated.

12. A thorough test of the well-water supply should be made under expert direction and advice.

13. By the expenditure of \$181,360 a system of irrigation can be provided for 25,000 acres and not less than 12,000 acres safely irrigated in all ordinary seasons. If the burden of cost is borne by 12,000 acres alone, the average of about \$15 per acre would be a moderate outlay. By the expenditure of about \$12.50 per acre, distributed over 25,000 acres, it may be possible to increase the irrigable area to cover 25,000 acres safely and to the fullest extent desired.

INVESTIGATIONS BY THE PRESENT BOARD.

58. The duty assigned to the board is to determine the feasibility and to report its opinion on the advisability of the San Carlos project for the irrigation of Indian, public, and private lands.

59. The feasibility (physical possibility) of the project depends upon that of constructing a dam of proper height and assured safety in the San Carlos Canyon; the feasibility of all the other elements of the project is manifest.

60. The borings of 1899 and 1903 had shown that bedrock at the 1899 site is at considerable depth, and this site was known to be open to the further objection that it is intersected by a fault. The board at its first inspection decided to begin boring about 1,000 feet upstream from the 1899 site, at a place where abutments of favorable appearance are found, and where the canyon is sufficiently wider at the stream level than at the 1899 site to suggest that bedrock might be encountered at less depth. If this site proved to be unfavorable, and in any event if time permitted, the board decided to supplement by additional borings the work done in 1899 and 1903 at the lower site.

61. The desirability or advisability of the project ("reasonability" in the act) depends upon the relation between cost and the value of

obtainable benefits. It involves among other things a determination of the acreage that can be irrigated and a comparison of the producing value of the irrigated land, with the cost of the project per acre. Involved in the determination of the acreage is the determination of the water supply at the reservoir site, the quantity which can be stored and drawn from storage, the reduction of storage capacity by silt accumulations, the losses from the reservoir due to evaporation and seepage, and the various losses which would occur between the reservoir and the lands, and finally the determination of the proper allowance or duty of water per acre.

62. As to water supply, the board realized that in the time at its disposal no great addition could be made to existing data, but hoped from a study of all available data, collateral as well as direct, to obtain more probable values for the mean, minimum, and maximum flows than those which had been deduced from the more limited data of earlier years.

63. It decided also to make a closer determination of the quantity of silt carried by the river, including that rolled along the bottom, than had heretofore been done. It was realized that if the silt approached in quantity that heretofore assumed, the life of the reservoir, measured in years, would be very short, and that the irrigated land would soon relapse into its present desert condition, or that desilting operations must very soon be undertaken. It has long been known that one of the most serious questions affecting the desirability of the project was whether silt accumulations in the reservoir could be disposed of within practicable limits of cost. The board, therefore, has made a study of methods of removing silt from the reservoir and an estimate of the cost of the most promising method.

DAM SITES, IMPOUNDING DAM.

(Appendixes B, C, and D.)

64. Maps Nos. 4 and 5 and Plates Nos. 2 to 11 show the canyon in which the dam sites now to be discussed are found, the location of holes drilled in 1899, 1903, and 1913, and the information obtained from the borings as to the depth to the bedrock. Two holes were drilled on line E (map No. 4) in 1899 by the United States Geological Survey. In 1903 the United States Reclamation Service completed line E and drilled lines D, C, and B and the easterly part of line A. Under the direction of the present board, line A was completed and line X drilled; also lines G, H, I, J, K, and M.

65. Considering nearness of the canyon walls to each other, the stretch of canyon shown affords two sites worthy of study; they will be referred to herein as the upper and lower sites. Faults cross the canyon obliquely at M and C. The former lies well below the upper site; the latter passes through the lower site, and therefore under or close to any dam that might be built there.

66. The dam discussed and recommended in 1899 (Water Supply Paper No. 33, p. 69 et seq.) was to be placed entirely below the lower fault. The topography of the abutments there is favorable for a dam of the height then under consideration, 130 feet from stream to spillway. The disadvantages of the site are depth to bedrock, 74 feet, and the existence of warm springs on both sides of the canyon there

and just below, which taken in connection with the fact that the rock at bottom and on both sides is limestone might well occasion some anxiety as to the soundness or water-tightness of foundation and abutments. Considering only spillway requirements and quantity of material in the dam, the most favorable of all the locations at either site for a dam 160 to 200 feet high would be near line B, but that would involve building the dam across the fault, which should be avoided if practicable. In the Second Annual Report of the Reclamation Service, page 89 et seq., a site just above the fault is referred to as follows:

The bedrock problem is very important at this point, as there is a fault in the strata almost directly across the canyon at the dam site, and it became necessary to locate the dam either above or below the narrowest part of the gorge in order to avoid this fault. * * * The general result (of the borings of 1903) shows that the depth to bedrock is somewhat less above the fault than below it, and this fact, together with the general desirability of leaving the fault entirely out of the reservoir, pointed to the location above the fault as the more feasible location for a high dam.

67. The borings of 1903 as supplemented by those of 1913 show that the maximum depth to bedrock decreases from about 50 feet at line B to 42 feet at line A and to 33 at line X. The borings of 1913 also show that at the upper site the maximum depth to bedrock is about 20 feet. In order to compare the lower site above the fault with the upper site, it will be necessary to anticipate the conclusion elsewhere reached in this report that the most suitable height of dam for this project, water storage and silt accumulation considered, is 180 feet, forming a reservoir of 709,626 acre-feet initial capacity. The height mentioned is from stream to spillway in the case of a dam with spillway or to crest in the case of an overfall dam. The board recommends for this project, and has considered in the following discussion and estimates, a masonry dam of gravity section, arched in plan. The curved plan is adopted for the usual reasons that it makes arch action available as reserve strength, though the section assumed is sufficient against all the forces acting, including upthrust, and that it lessens the tendency to cracking near the top due to shrinkage and temperature changes. It is also an additional safeguard against sliding, though that danger is absent in the case of this comparatively short dam standing between walls that converge downstream.

68. Conforming to current practice in the case of high dams the board adopts the spillway type, but has given the main part of the dam such form and dimensions that it will serve as an overfall dam if need be. At either site quarrying to obtain rock for the construction of the dam would go far toward providing the space in which to build a spillway 300 feet long.

69. It is judged that in 1905 a flood of approximately 150,000 second-feet passed San Carlos; but a flow of exceeding 50,000 second-feet is of rare occurrence. Considering the moderating effect of a reservoir with so large an area, seldom, if ever, will more than 25,000 second-feet need to pass over the spillway. (See Appendix D for behavior of reservoir under assumed maximum probable flood.) With water running 10 feet deep over a spillway 300 feet long, the discharge would be about 33,000 cubic feet per second, and accordingly the maximum flow line is assumed at the 190-foot contour. In determining pressures to be used in designing the dam, however, the

water has been assumed to stand at elevation 200. If after the dam is built it is found desirable to store to a higher level than 180 feet, it will be practicable by placing gates in the spillway to raise the storage line to 185 feet or possibly higher, these gates, when the reservoir is full, to be opened upon receipt of telegraphic notification of approaching floods.

70. In various reports, notably the report of the 1905 board (par. 31), stress is laid on the fact that the dip of strata at the lower site is downstream. The strata at the upper site also dip downstream, but, as stated above, there is no danger of sliding. The board believes, however, that on account of the dip of the strata it is advisable at either site to design the dam against possible upthrust due to water gaining entry under the dam. It has been assumed, therefore, that under the heel of the dam such upward pressure will be that due to a head of 200 feet above stream level and that it will diminish uniformly to nothing at the toe.

71. For detailed account of the processes followed in designing the dam, see Appendix D. The dam proposed for the upper site is shown in plan on map No. 4 and in section on figure 3, Appendix D. The photographs herewith show the topography of the canyon and of the sites discussed in the report. (Pls. 2 to 11.)

72. In estimating quantities in the dams at the two sites, it is assumed that below stream level the bedrock is removed to the average depth of 3 feet vertically below the contours indicated by the borings, and that above stream level the excavation at the lower site is to the depth of 7 feet vertically into the rock and at the upper site 3 feet. The reason for the difference in the assumed depths of excavation is that the upper rock strata are exposed to view at the upper site and are known to be of sound rock, while the upper strata at the lower site are covered by a talus of boulders, preventing examination, but with indications that they are of softer rock (indicated by the easterly borings on lines A and X, and the westerly boring on line X).

73. At the lower site the depth to bedrock is such that the maximum width of the dam measured up and down stream will be about 215 feet. In order to be entirely clear of the fault, the heel, as shown in map No. 4, would have to reach a point about 20 feet upstream from line X. In this position, the contents of the dam would be 236,880 cubic yards, of which 32,011 would be below stream level and 204,869 above.

74. At the upper site, considering the depth to bedrock and the character and configuration of the abutments, the best location for a dam of the height under consideration is as shown on map No. 4, the dam being tangent to line G. This dam would have a volume of 22,565 cubic yards below the datum plane and 238,781 cubic yards above, or a total of 261,346 cubic yards.

75. The board believes that a masonry dam of reasonable height could be safely built at either site, yet, notwithstanding that the yardage at the lower site is about a tenth less, the board decidedly prefers and recommends the upper site. At the upper site the depth to bedrock is much less, which, in connection with the somewhat greater width of canyon at stream level, would make the handling of the river during construction less difficult. The distance of the dam from the nearest fault is several times greater than in the case of the

lower dam. The rock is quartzite or quartzitic sandstone, while at the lower site it is limestone and contains warm springs, indicating the possibility of cavities. The abutments above stream level are wholly in sight and are sound, while at the lower site the lower part of the right bank abutment is somewhat shattered and may possibly be detached from the mass of the hillside. The indications are that a branch of the fault below it runs obliquely upstream approximately parallel to the bluff line and some 40 or 50 feet behind it, and that one or more fractures extend from the face of the cliff back to this branch.¹ Even the advantage of the lower site in respect to the quantity of material in the dam might prove illusory when the preparation of the abutment on the right bank was undertaken, for the removal of a considerable quantity of rock might be found necessary there. Finally the upper site is more accessible for construction purposes than is the lower, and is nearer to the area in which dredging for desilting will be required.

76. *Elements of cost.*—It is assumed that the dam is to be of cyclopean masonry, consisting of random stone of variable sizes embedded in concrete; that 40 per cent of the mass will be random stone and 60 per cent concrete; that concrete will be of 1 part Portland cement, 2½ parts sand, and 5 parts broken stone; and that it will be deposited against forms without the use of any hewn stone to make the walls. At the present time Portland cement would cost, delivered at the dam site, about \$3.50 per barrel. It is not overlooked that important structures are being built of sand cement. But with cement at present prices or less, cheap power for grinding not available, and cost of plant high for the amount of cement required, there is little inducement to depart from the established practice of using ordinary cement. However, when the time arrives for construction the way may seem clear to use sand cement, for which quartzite is conveniently available; or possibly a mixture of cement and tufa, of which there is an accessible deposit some 6 or 8 miles away. Sand for concrete may be obtained in the river bed at the site, though some, if not all of it, would have to be washed. It may also be made from quartzite crusher screenings. The choice will probably depend on cost of power for crushing, on amount of washing required for the river sand, and on supply of water, for the river is sometimes dry.

77. The broken stone and the random stone would be taken from the location where quarrying would provide a spillway past the easterly end of the dam. The stone, being quartzite, is of good quality for the work. At the high elevation, above 180 feet, the exposed rock is full of small fractures; and quarrying for the random stones may give more small stone than is required for concrete and for intermixing with the larger stones in the construction, thus involving some waste.

78. For hauling material and supplies from the railroad, 7 or 8 miles distant, a wagon road will have to be built on the northerly and westerly side of the reservoir, and as part of it will require heavy earthwork, rockwork, and some bridging, it will be costly.

¹ See Plates 4 and 11

79. *Estimate of cost per cubic yard of dam.*—

0.4 cubic yard of random stone in place, at \$2.....	\$0.80
0.6 cubic yard of broken stone, at \$1.....	.60
0.3 cubic yard of sand, at \$1.....	.30
0.75 barrel of cement, at \$3.50.....	2.625
Forms for concrete.....	.15
Labor on concrete, 0.6 cubic yard, at \$1.33½.....	.80
Total.....	5.275

Excavation of foundation, 26,000 cubic yards, increased to 52,000 cubic yards in anticipation of duplication on account of possible floods, at \$1 per cubic yard, including pumping.....	\$52,000
Diversion of river.....	70,000
Road building.....	50,000
Camp, including water supply.....	45,000
Plant.....	200,000
Towers, conduits, gates and valves, including power plant for their operation.....	300,000
Total.....	717,000

Seven hundred and seventeen thousand dollars amounts to about \$2.726 per cubic yard of masonry in the proposed dam and spillway weir, increasing the cost to \$8 per cubic yard. The cost of the dam, not including engineering and contingencies, will then be: 263,000 cubic yards (which includes spillway weirs), at \$8, \$2,104,000.

PROPERTIES OF RESERVOIR SITE.

80. The table below, furnished by the United States reclamation office at Phoenix, and used by the 1905 board in preparing the diagram which accompanied its report, shows the properties of the reservoir site for dams of various heights at the lower (1899) dam site. Capacities are not reduced materially by assuming the dam to be at the upper site.

Contour.	Area.	Total contents.	Contour.	Area.	Total contents.
<i>Feet.</i>	<i>Acres.</i>	<i>Acre-feet.</i>	<i>Feet.</i>	<i>Acres.</i>	<i>Acre-feet.</i>
0	0	0	120	5,191	184,291
10	17	86	130	6,230	241,396
20	41	376	140	7,348	309,286
30	84	999	150	8,600	389,026
40	210	2,466	160	9,960	481,826
50	488	5,956	170	11,390	588,576
60	924	13,069	180	12,820	709,626
70	1,549	25,485	190	14,250	844,976
80	2,195	44,706	200	15,680	994,626
90	2,624	68,801	210	17,110	1,157,676
100	3,475	99,297	220	18,540	1,335,926
110	4,148	137,415	230	19,970	1,528,476

EVAPORATION FROM RESERVOIR.

(Appendix E.)

81. The net loss by evaporation from the reservoir as arrived at in Appendix E will be taken at 60 inches per year.

SEEPAGE FROM RESERVOIR.

82. There is nothing in the appearance of any part of the area to be covered by the reservoir to indicate that any considerable loss may be expected from seepage. Accordingly no allowance for seepage from the reservoir is made. Neither is excess storage in the ground counted upon, though this will make a certain quantity of water available at low stages when most needed.

WATER SUPPLY.

(Appendix F.)

83. The following table shows the run-off of the Gila at San Carlos for all years for which there is direct or indirect information. The derivation of the table is explained in Appendix F.

Run-off of Gila River at San Carlos, Ariz.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.
1890 ¹	37,631	28,890	21,416	12,745	4,815	1,500
1895.....	(56,000)	(14,000)	(5,000)	(0)	(17,000)	(3,000)
1896.....	21,914	10,824	13,392	9,640	1,771	268
1897.....	71,167	44,135	38,849	37,166	12,396	2,785
1898.....	35,417	24,242	26,175	29,294	16,159	13,496
1899.....	17,597	11,946	7,194	3,320	996	276
1900.....	(5,000)	(10,000)	(50,000)	306	180	33
1901.....	8,670	61,600	26,200	3,530	338	186
1902.....	6,119	3,078	625	0	0	0
1903.....	10,400	2,960	2,200	3,010	136	6,370
1904.....	1,949	1,875	676	315	535	0
1905.....	56,808	142,644	263,112	237,396	55,519	15,200
1906.....	20,916	53,040	116,640	58,800	20,652	5,227
1907.....	200,640	105,360	68,720	44,400	21,456	13,236
1908.....	(30,000)	(72,000)	(42,000)	(38,000)	(9,000)	(0)
1909.....	11,436	17,760	80,040	47,520	17,616	3,937
1910.....	27,456	12,683	11,165	8,899	3,784	2,904
1911.....	27,665	19,239	114,290	19,525	744	3,069
1912.....	11,825	7,733	123,530	43,780	21,329	19,855
Total.....	658,610	644,009	1,011,024	597,646	204,396	91,312
Mean.....	34,664	33,895	53,212	31,455	10,758	4,806

Year.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1890 ¹	7,196	173,600	6,854	8,690	11,353	15,218	329,908
1895.....	(25,000)	87,602	43,485	87,269	59,070	41,559	438,985
1896.....	79,744	44,825	52,483	229,381	55,535	34,808	554,585
1897.....	31,267	44,216	126,976	(51,000)	(0)	(5,000)	464,957
1898.....	111,895	29,716	14,459	4,372	5,409	16,878	327,512
1899.....	73,300	25,100	24,800	(15,000)	(10,000)	(5,000)	194,529
1900.....	16	12,200	55,800	3,690	10,500	6,270	153,965
1901.....	23,200	29,600	12,600	4,150	13,300	6,760	190,104
1902.....	1,309	48,698	5,821	0	0	34,286	99,936
1903.....	3,280	59,200	13,300	6,520	3,300	2,180	112,856
1904.....	8,793	58,540	13,800	50,730	6,664	18,820	162,697
1905.....	6,120	27,100	32,400	9,160	112,020	53,603	1,011,082
1906.....	8,820	38,484	10,308	7,015	8,664	78,120	426,686
1907.....	15,564	52,560	50,928	19,956	26,232	17,052	635,904
1908.....	(33,000)	(50,000)	(12,000)	(5,000)	(11,000)	(36,000)	(338,000)
1909.....	13,440	29,736	23,244	7,662	7,877	13,116	273,384
1910.....	2,783	5,764	5,346	7,788	11,440	9,944	109,956
1911.....	57,310	16,115	29,590	54,340	17,985	15,895	375,767
1912.....	64,240	22,660	21,021	18,612	14,845	14,542	383,972
Total.....	566,277	855,716	555,215	590,335	385,194	425,051	6,584,785
Mean.....	29,804	45,038	29,222	31,070	20,273	22,371	346,568

¹ Seasonal year Sept. 1, 1889-Aug. 31, 1890.

Figures in parentheses are estimated; see Appendix F.

84. While the run-off data are not as complete nor probably as accurate as could be desired, they indicate a variation in yearly discharge of from about 100,000 acre-feet to more than 10 times that amount, and a probable mean annual run-off of about 346,000 acre-feet.

85. With a dam 180 feet high, giving a reservoir of about 709,000 acre-feet capacity, a portion of the run-off of 1905 would, of course, have passed over the spillway. The same would probably be true of at least an occasional run-off of 600,000 or even 500,000 acre-feet. Allowing for this, the average amount that could be stored yearly by a dam 180 feet high would probably not exceed about 310,000 acre-feet. On the other hand, not all the water which passes over the spillway in excess of the usual draft would necessarily be wasted, since a portion of it at least would be taken into the main canal. The main canal will have a capacity greater than that required to carry the amount usually applied to irrigation, and the excess water would be used for such purposes as seem best at the time.

86. The most striking fact disclosed by the table is not the great difference between the maximum and minimum run-offs, but the length of the periods during which the annual run-offs are continuously below the mean. Thus the run-off was below the average each year of the three years 1908-1910 and of the seven years 1898-1904. The need for hold-over storage is apparent.

SILT.

(Appendix G.)

87. In the earlier determinations of the amount of silt in the Gila, the method followed was to allow the muddy water to settle for a day, or for several days, in a test tube, and to note the volumetric relation of deposited silt to the water sample, and then to divide the percentage thus obtained by 5 in order to reduce to the percentage of volume which the silt would finally occupy as soil in a reservoir. Though this sample method is useful, in a general way, for making comparisons, and is doubtless correct for some degree of muddiness of water, it does not apply to all the varying degrees of muddiness nor to the records obtained by test tubes of different heights. Columns of silt of different heights have different densities, dependent on the compression due to their own weights. The size of the test tubes used also has some effect on the degree of settlement of the deposit. Mr. Hughes's experiments show that the divisors for reduction of deposit in tube to soil vary from as low as 5 for the highest percentages to perhaps as high as 10 for the small percentages. The density of silt in the test tube depends also on its specific gravity, its fineness, and other physical properties.

88. The most approved method for making silt observations is to take samples of muddy water of given volume or weight, allow the sample to settle, decant the clear water, and evaporate the remainder and then weigh the silt. In passing from weight of silt (as compared with the weight of the sample of water) to the volume which it will occupy in a reservoir, Mr. Hughes's figures, determined from 15 samples, give 70 pounds per cubic foot as the average weight of the dry material in place in the reservoir. Mr. W. W. Follett's use of 53 pounds per cubic foot was based upon a single observation only.¹

¹Silt in the Rio Grande, by W. W. Follett.

89. Volumetric measurements were made at the Buttes in July, 1893; July-December, 1895; and in January-July, 1899; and at San Carlos in April-December, 1901; July-October, 1904; March-December, 1905; and in August-October, 1913. Weight observations were made at the Buttes in November-December, 1899; and in January-March and August-November, 1890; and at San Carlos in January-December, 1902; and April-December, 1905.

90. Using 70 pounds per cubic foot with all of these silt observations, Mr. Hughes arrives at 1.3 as the percentage of silt by volume carried by the river at San Carlos, and the board adopts this figure. This percentage includes that rolled along the bed of the stream, which is thought to be about 10 per cent of the amount carried in suspension. The average yearly run-off of the river being about 346,000 acre-feet (par. 83), the average amount of silt carried each year past San Carlos dam site is about 4,500 acre-feet, or approximately 7,200,000 cubic yards.

91. At all seasons of the year, when the river is low, the water is clear. Silt is an accompaniment of a rise in the river, but the percentage of silt falls short of being proportional to the flow, even during the muddy season. Thus it follows that in general the wet years have lower percentages of silt than do the dry ones, a fact which is also indicated by the silt observations on the Rio Grande.

92. The available data show that at San Carlos, considering all the years in which observations have been made, about 40 per cent of the yearly run-off is in the months of July-October and carries about $2\frac{1}{2}$ per cent of silt, while the run-off for the remainder of the year carries hardly one-half per cent. This indicates that 1.3 per cent is a liberal figure to be applied to the total yearly run-off.

93. Not all of the silt entering the reservoir will be retained there. A portion will flow through in suspension, and a portion will be sluiced through at times of low water in the reservoir. The quantity sluiced through might be increased by diverting the waters entering the reservoir from the Gila and the San Carlos Rivers, so that they will flow over the higher sediment banks and cause them to scour away. No way is known by which the proportion of the sediment permanently retained in the reservoir can be calculated, but it is assumed that about one-sixth will pass through the reservoir in suspension and by sluicing, and that five-sixths will remain in the reservoir. The annual amount of filling of the reservoir is therefore estimated to be about 3,750 acre-feet, or approximately 6,000,000 cubic yards.

MOST SUITABLE HEIGHT OF DAM.

94. In order to store the excess run-off of years of large flow for use during years in which the run-off is below the average, the capacity of the reservoir must be greater than that required to contain the mean annual run-off. Holdover storage is necessary in this case partly on account of the great difference between the average river discharge and the discharge in years of exceptionally low flow, and, especially on account of the fact that periods during which the flow is below the average, may extend over several years. Additional storage capacity must be provided in which to impound silt in order that desilting operations may be postponed as long as may be economical or otherwise desirable.

95. The longest recorded period of low flow is that of 1898-1904.

Annual run-off of Gila River at San Carlos, 1898-1904.

Year.	Run-off.	Percentage of yearly mean.	Deficiency compared with yearly mean.
	<i>Acro-feet.</i>	<i>Per cent.</i>	<i>Acro-feet.</i>
1898.....	327,512	95	19,066
1899.....	194,520	56	152,039
1900.....	153,965	44	192,603
1901.....	190,104	55	156,464
1902.....	99,936	29	246,632
1903.....	112,856	33	233,712
1904.....	162,697	47	183,871
Total.....	1,241,599	.....	1,184,377

96. Using the run-off data for this period, allowing for evaporation and assuming the several reservoirs considered to have been full at the beginning of the period (as they would have been had the reservoir been completed by January 1, 1895) the board has constructed a large number of diagrams to show the behavior of reservoirs of various capacities under different assumptions as to the yearly quantity of water withdrawn for irrigation.

97. Certain of these diagrams follow. In those diagrams in which a yearly delivery of 200,000 acre-feet is assumed, the monthly drafts used are shown in the following table:

Months.	Draft in acre-feet.	Percentage of yearly total.
January.....	9,000	4.7
February.....	11,000	5.4
March.....	18,000	9.0
April.....	22,000	11.2
May.....	21,000	10.6
June.....	18,000	8.7
July.....	19,000	9.7
August.....	26,000	12.8
September.....	20,000	10.1
October.....	13,000	6.4
November.....	13,000	6.6
December.....	10,000	4.8
Total.....	200,000	100.0

These percentages are those furnished by the Phoenix office of the Reclamation Service as the result of five years' experience (1908-1912) under the Salt River project.

98. In those diagrams in which a yearly delivery of 250,000 acre-feet is assumed, the monthly drafts used are as follows:

Months.	Draft in acre-feet.	Months.	Draft in acre-feet.
January.....	11,000	July.....	19,000
February.....	21,000	August.....	26,000
March.....	30,000	September.....	20,000
April.....	30,000	October.....	15,000
May.....	27,000	November.....	21,000
June.....	18,000	December.....	12,000

The differences between these tables result from assuming that the excess over 200,000 acre-feet would be applied in four irrigations on grain.

99. In all of the diagrams, the assumed monthly net loss from the reservoir due to evaporation is as given in paragraph 19 of Appendix E.

100. Diagram No. 1 shows that a reservoir kept by some desilting process at a capacity of 600,000 acre-feet would have furnished 200,000 acre-feet yearly throughout the period 1898-1904.

101. Diagram No. 2 shows that a reservoir kept by some desilting process at a capacity of 600,000 acre-feet would not have furnished 250,000 acre-feet in 1903 or 1904.

102. Diagram No. 3 shows that a reservoir kept by some desilting process at a capacity of 500,000 acre-feet would have furnished 200,000 acre-feet throughout the period 1898-1904, except for a slight deficiency in 1904.

103. Diagram No. 4 shows that the 500,000 acre-foot reservoir would not have supplied 250,000 acre-feet in 1902, 1903, or 1904.

104. Diagram No. 5 shows that a reservoir kept by some desilting process at 400,000 acre-feet capacity would not have furnished 200,000 acre-feet throughout the period.

105. From a study of these diagrams the board concludes that the largest quantity of water on which it would be safe to count, year in and year out, is 200,000 acre-feet; and that to deliver this quantity the storage capacity of the reservoir must be maintained at 500,000 acre-feet.

106. Two hundred thousand acre-feet is accordingly used as the basis for determining the number of acres of land to be taken into the project (par. 153); but it should not be overlooked that more than this quantity will be available every year except during long dry periods, while only very exceptionally will less be available.

107. The average quantity of silt brought into the reservoir each year is estimated to be about 4,500 acre-feet (par. 90); and it has been assumed that one-sixth of this will be carried through the reservoir, and that the remaining 3,750 acre-feet, or about 6,000,000 cubic yards, will lodge in the reservoir, gradually decreasing its capacity. If the reservoir is to endure indefinitely, desilting must sooner or later be resorted to. It is estimated that at present prices the cost of desilting (par. 132) would be about \$3.33 per acre per year. The question then is: What capacity in addition to the 500,000 acre-feet allowed for water storage should be provided for the impounding of silt?

108. Physical conditions at the site are such that a dam of any height up to the limit permitted by the strength of masonry is feasible. It is therefore practicable to create a reservoir of sufficient excess capacity to hold silt for several generations. Thus, a dam 200 feet high would form a reservoir of 994,626 acre-feet capacity, which, allowing 500,000 acre-feet for water storage, would hold the silt accumulations of 132 years. The corresponding figures for a dam 220 feet high are 1,335,926 acre-feet and 223 years. Great accuracy is not claimed for these figures or others used herein for the life of reservoirs. It is hardly necessary to point out that, assuming the water to continue to be drawn through a low outlet in the dam, the reservoir would never completely fill with silt; since, after the

capacity had been reduced to a certain point, the river would run through the reservoir with little opportunity to deposit its sediment.

109. It is assumed that the cost of the project will be divided between the United States and the owners of private land taken into the project, in proportion to the quantity of water allotted to Indian and private lands, respectively, and that the private landowners will pay their part in 20 equal annual payments. (Pars. 153, 167.)

110. In order that the cost of desilting may not begin until after the project has been paid for, the smallest reservoir that should be considered is one which, in addition to 500,000 acre-feet for water storage, would afford room for 20 years' silt accumulations. Such a reservoir would have a capacity of 575,000 acre-feet and would require a dam 168 feet high to spillway.

111. A dam 180 feet high to spillway would afford storage for silt for 55 years, and with gates in the spillway raising the storage level 5 feet, for 74 years. With the higher dam desilting by dredging would be cheaper, because length of haul would be less.

112. The difference between the first cost of a dam 168 feet high to spillway and one 180 feet high to spillway will be about \$210,000, or about \$2.33 per acre for a project of 90,000 acres. In the case of a dam 190 feet high to spillway, the difference, including an increase in flowage damage, would be perhaps \$800,000 or about \$9 per acre.

113. These calculations show that increasing the reservoir capacity by raising the dam is the cheapest and easiest way of handling, or, as Mr. Davis has aptly said, of evading the silt problem. But there are two objections to raising the dam above that height which will obviate the need of desilting operations for a longer period than 50 to 75 years. The first is that this would be taxing the present generation, and perhaps the next, in order to permit later generations to escape the cost of desilting. It is true that the dam and other permanent elements of the project, which are to be paid for by the present generation, will be used by later ones without cost; but this is unavoidable, unless payments be distributed over a longer term of years than is now considered advisable. But a more important reason for not building the dam higher than 180 feet to spillway is that the irrigated lands stand in need of the silt as a fertilizer. As to the fertilizing value of silt in this region, Prof. Forbes, in Bulletin No. 44, University of Arizona Agricultural Experiment Station, page 163, calculates that the Salt River lands annually receive in the irrigating water \$4.17 worth of fertilizer per acre, not counting substances not needed by that land, nor those escaping with seepage; and his table, page 190 of same bulletin, indicates that Gila River silt is still more valuable.

114. The water diverted by the main canal will not be entirely without silt. It is assumed that the water released from the reservoir will contain one-sixth of the normal content of silt; and the San Pedro water will, of course, be unaffected by the San Carlos Reservoir. Nevertheless, the normal percentage of silt would be more valuable to the land, and in time it is likely that it will be necessary, if the purchase of artificial fertilizers is to be wholly or partially avoided.

115. Having in mind, then, that the most suitable height of dam is that which will give a reservoir from which may be drawn the maximum possible constant supply of water through the long dry

periods that may be expected, without imposing too great a burden of cost upon this or the next generation, and without holding back silt beyond the time when the irrigated lands will need it as fertilizer, and believing that it will be inadvisable on both accounts to attempt to postpone desilting beyond from 50 to 75 years, the board concludes that the most suitable height of a dam for the San Carlos project is 180 feet to spillway. The reservoir thus formed will be of 709,626 acre-feet capacity, giving 500,000 acre-feet for water storage and room for 55 years' silt accumulations, and by putting gates in the spillway the capacity can be increased to 777,000 acre-feet and the time extended to 74 years.

116. Certain behavior diagrams relating to the reservoir formed by a dam 180 feet high to spillway follow.

117. Diagram No. 6 shows how a reservoir formed by a dam 180 feet high to spillway would have behaved during the period 1895-1912, if the dam had been completed January 1, 1895; if 200,000 acre-feet had been drawn yearly from the reservoir; and if 1.1 per cent of the inflow had been silt that lodged in the reservoir.

118. Diagram No. 7 shows that the reservoir formed by a dam 180 feet high to spillway would not have furnished 250,000 acre-feet through the dry period 1898-1904, and that the deficiencies in 1903 and 1904 would have been so great that in the absence of an auxiliary pumping supply crops would have suffered. This assumes that in 1902 the full draft of 250,000 acre-feet would have been taken, notwithstanding that on January 1, 1902, the reservoir contained but 279,000 acre-feet of water.

119. At the Engle Reservoir of the United States Reclamation Service conditions are not dissimilar to those at San Carlos. The mean runoff of the Rio Grande (at San Marcial) is 1,150,000 acre-feet, the minimum about one-fifth as much, and the capacity of the reservoir 2,627,000 acre-feet, or about 2.28 times the mean runoff. At San Carlos the mean runoff is 346,000 acre-feet, the minimum less than one-third as much, and the capacity of the reservoir (to the 185-foot elevation) 777,301 acre-feet, or about 2.25 times the mean runoff. The percentage of silt assumed for the Rio Grande is 1.8, as against the board's determination of 1.3 for the Gila. The additional capacity allowed for silt accumulation is, therefore, slightly greater, relatively, at San Carlos than at Engle.

FLOWAGE DAMAGE.

(Appendix H.)

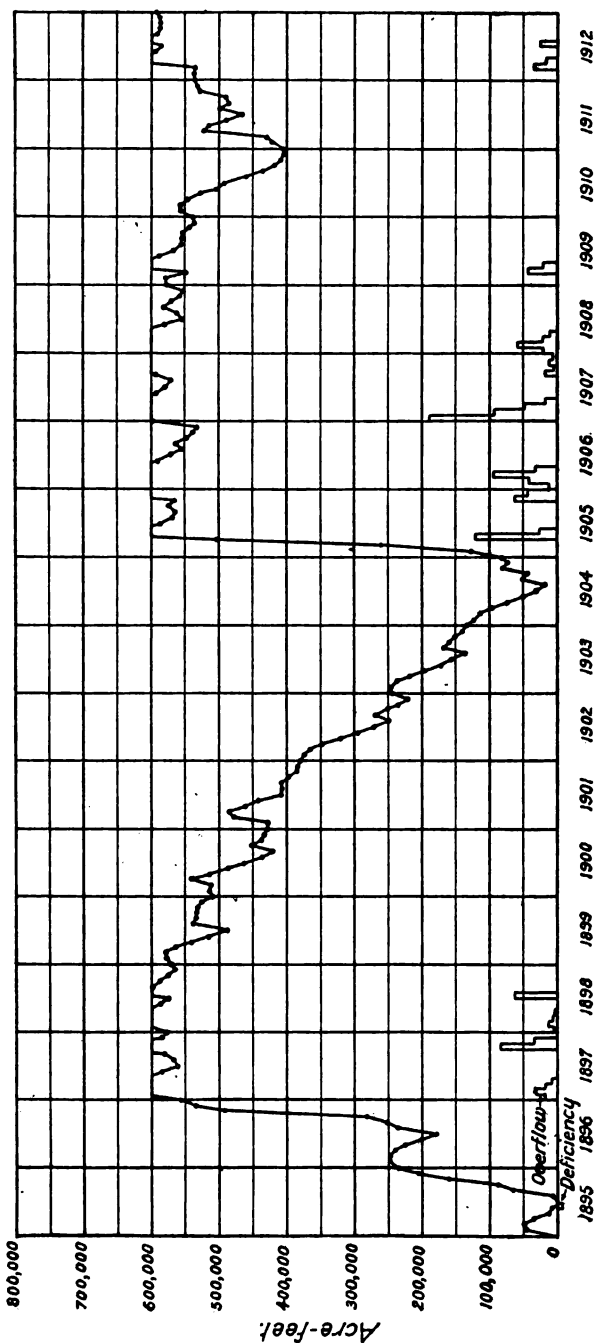
120. The construction of a dam of the height proposed by the board will create a reservoir about 16 miles long, averaging $1\frac{1}{4}$ miles in width, which will flood the present Indian agency and about 5 miles of the track of the Arizona Eastern Railroad Co., necessitating the relocation of some 12 miles of track to carry the railroad around the easterly end of the reservoir. (Map No. 3.)

121. The damage to the agency in buildings, lands, etc., is discussed in report of C. R. Olberg, superintendent of irrigation, and in the letter of A. L. Lawshe, superintendent San Carlos Agency, addressed to the Commissioner of Indian Affairs and dated October 23 and 28, 1913, respectively, copies of which will be found in Appendix H.

Corps of Engineers, U.S. Army.

War Department.

Behavior of reservoir of 600,000 acre-feet constant capacity (silt removed as brought in), the annual delivery for irrigation being, when possible, 200,000 acre-feet.



War Department.

Corps of Engineers, U.S. Army.

Behavior of reservoir of 600,000 acre-feet constant capacity (silt removed as brought in), the annual delivery for irrigation being, when possible, 250,000 acre-feet.

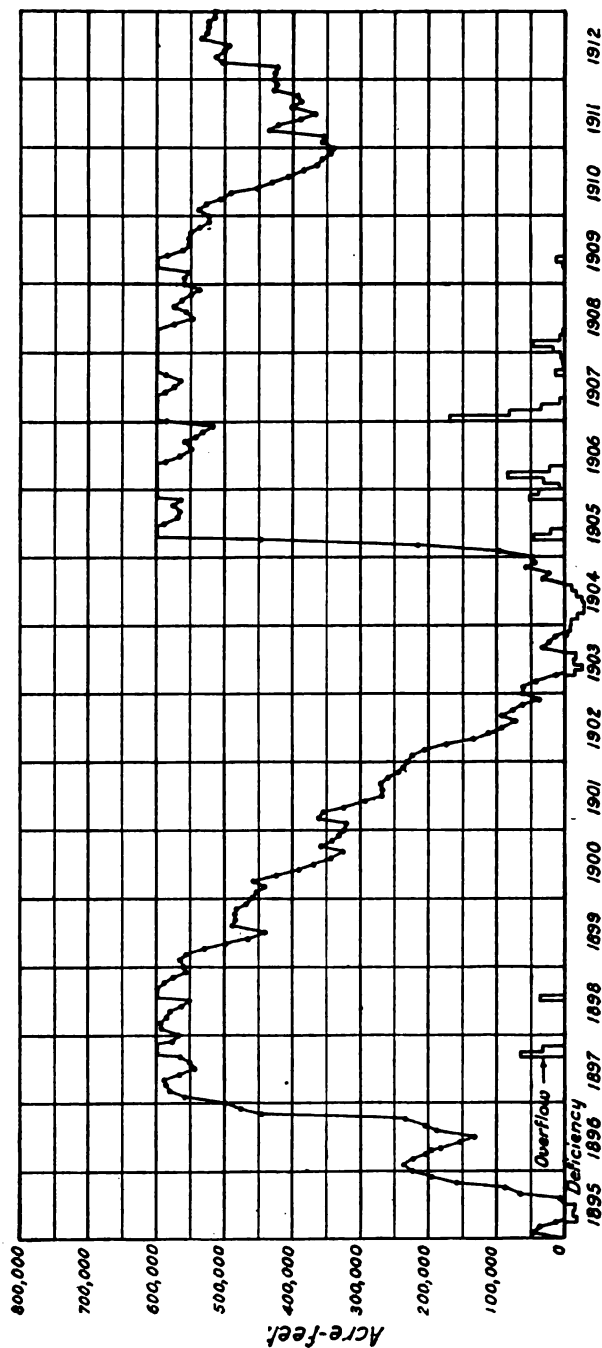


Diagram No.2. San Carlos Irrigation Project.

Behavior of reservoir of 500,000 acre-feet constant capacity (silt removed as brought in), the annual delivery for irrigation being, when possible, 200,000 acre-feet.

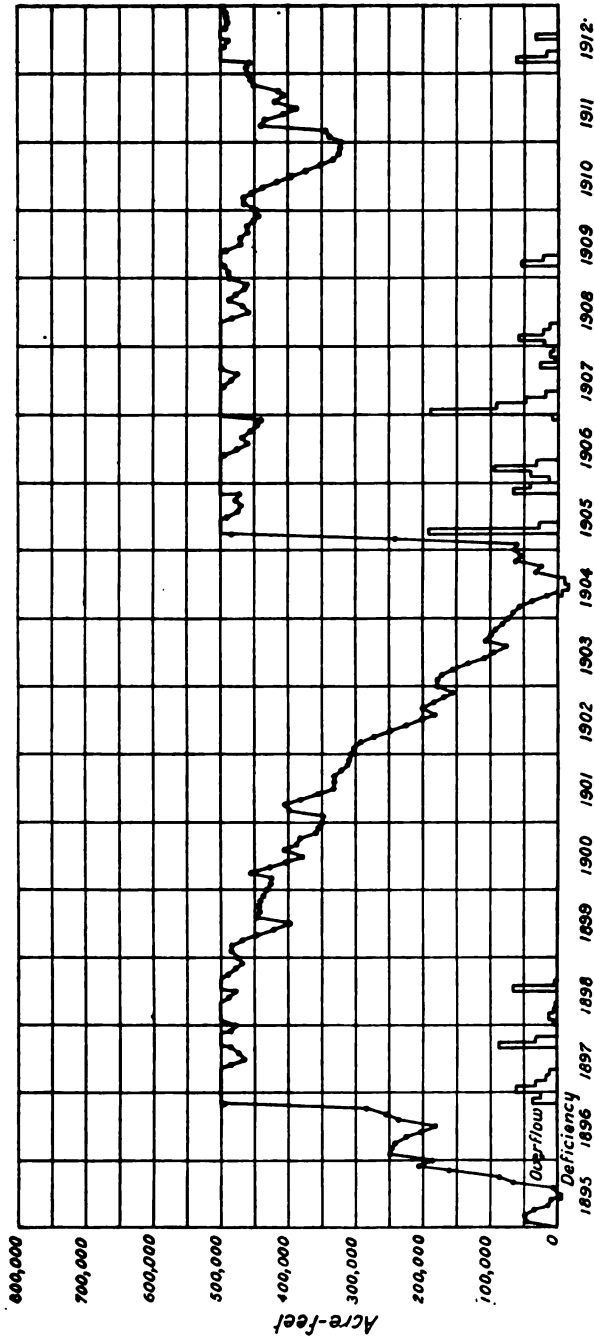


Diagram No.3. San Carlos Irrigation Project.

War Department.

Corps of Engineers, U.S. Army.

Behavior of reservoir of 500,000 acre-feet constant capacity (silt removed as brought in), the annual delivery for irrigation being, when possible, 250,000 acre-feet.

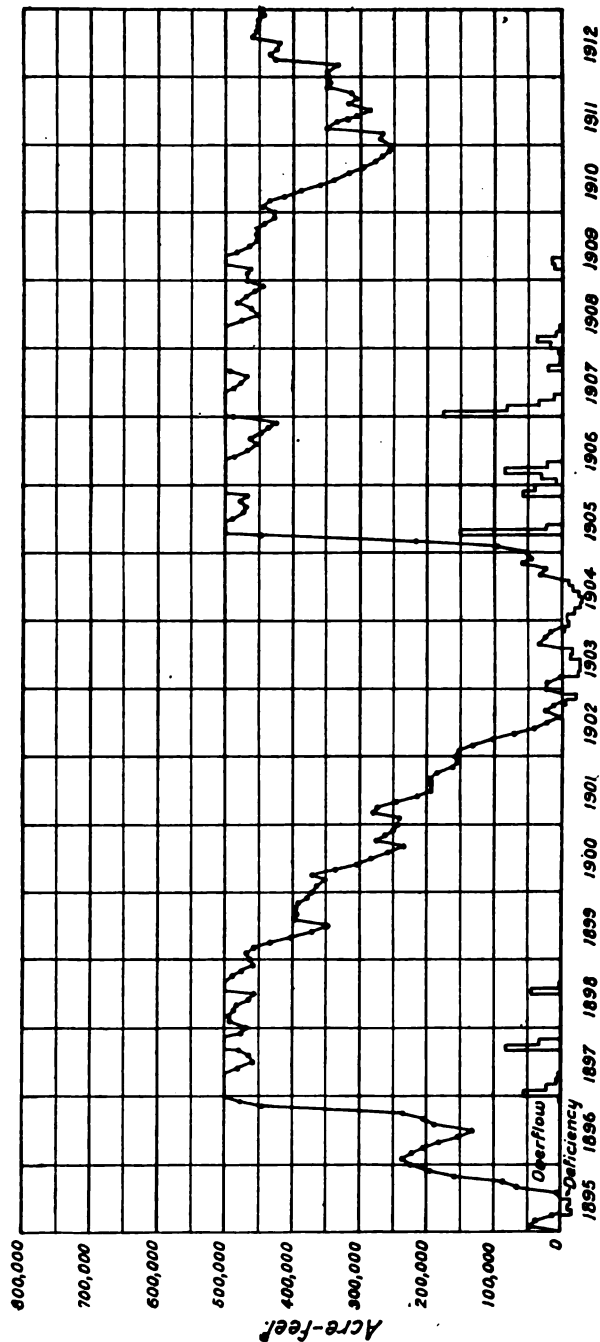


Diagram No. 4. San Carlos Irrigation Project.

Behavior of reservoir of 400,000 acre-feet constant capacity (silt removed as brought in), the annual delivery for irrigation being, when possible, 200,000 acre-feet.

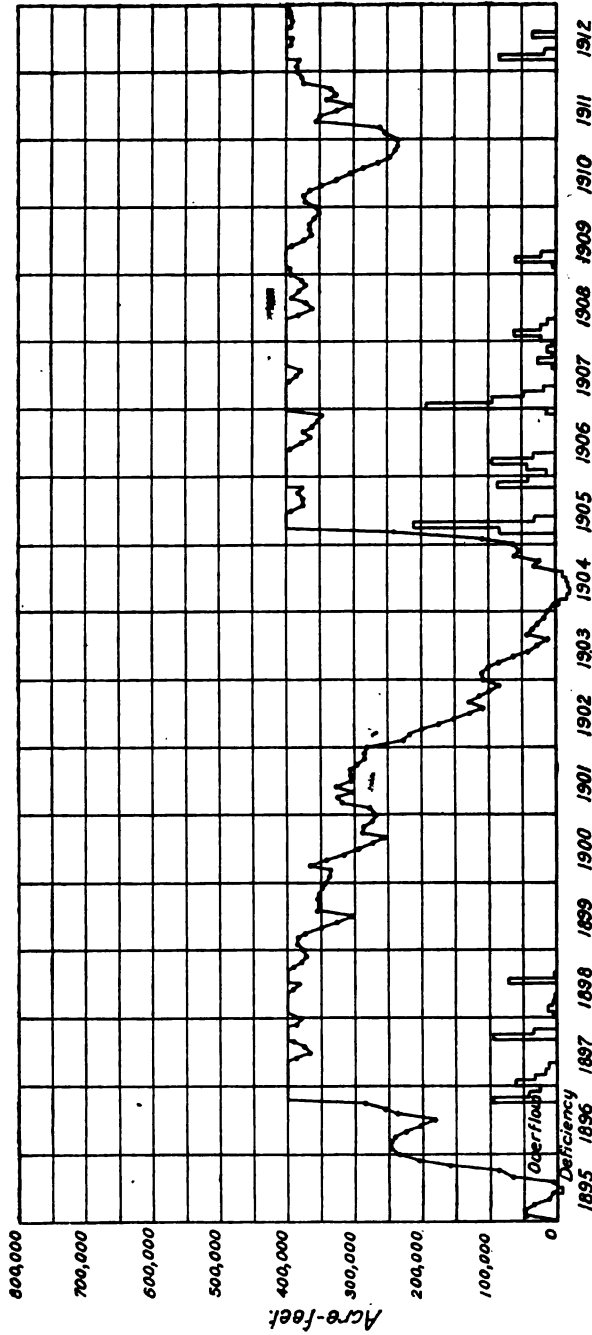


Diagram No. 5. San Carlos Irrigation Project.

War Department.

Corps of Engineers, U.S. Army.

Behavior of reservoir of 709,626 acre-feet initial capacity (dam 180 feet high) silt assumed to amount to 1.1% of water supply, the annual delivery for irrigation being, when possible, 200,000 acre-feet.

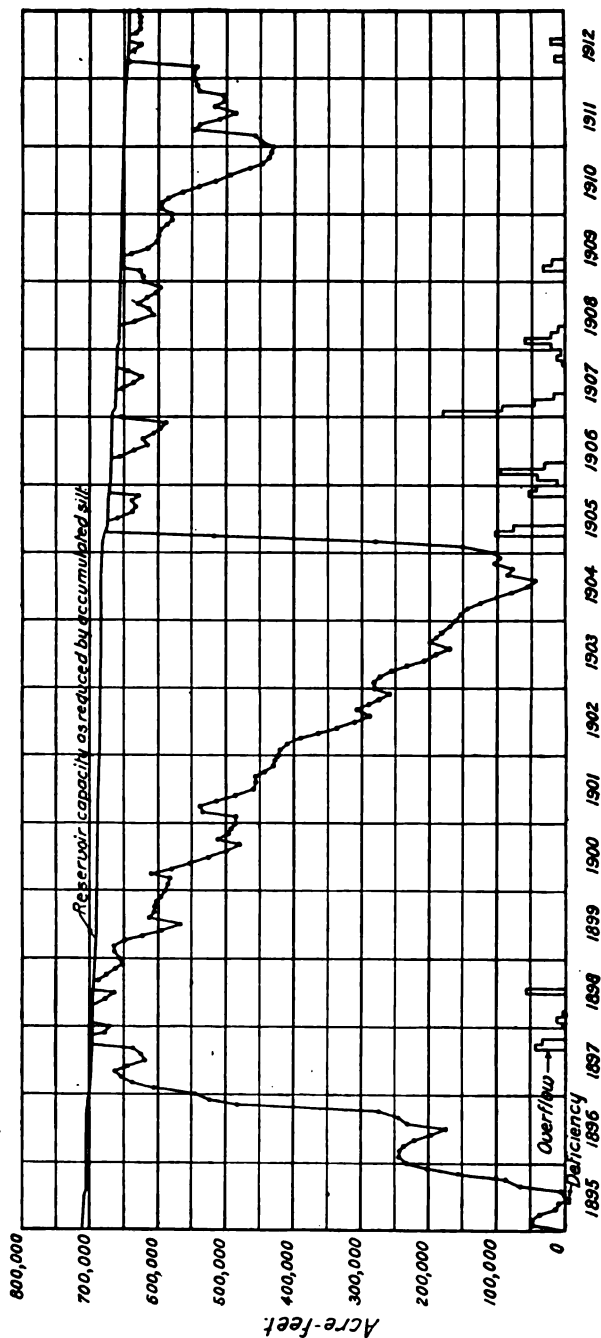


Diagram No. 6. San Carlos Irrigation Project.

Behavior of reservoir of 709,626 acre-feet initial capacity (dam 180 feet high) silt assumed to amount to 1.1% of water supply, the annual delivery for irrigation being when possible 250,000 acre-feet.

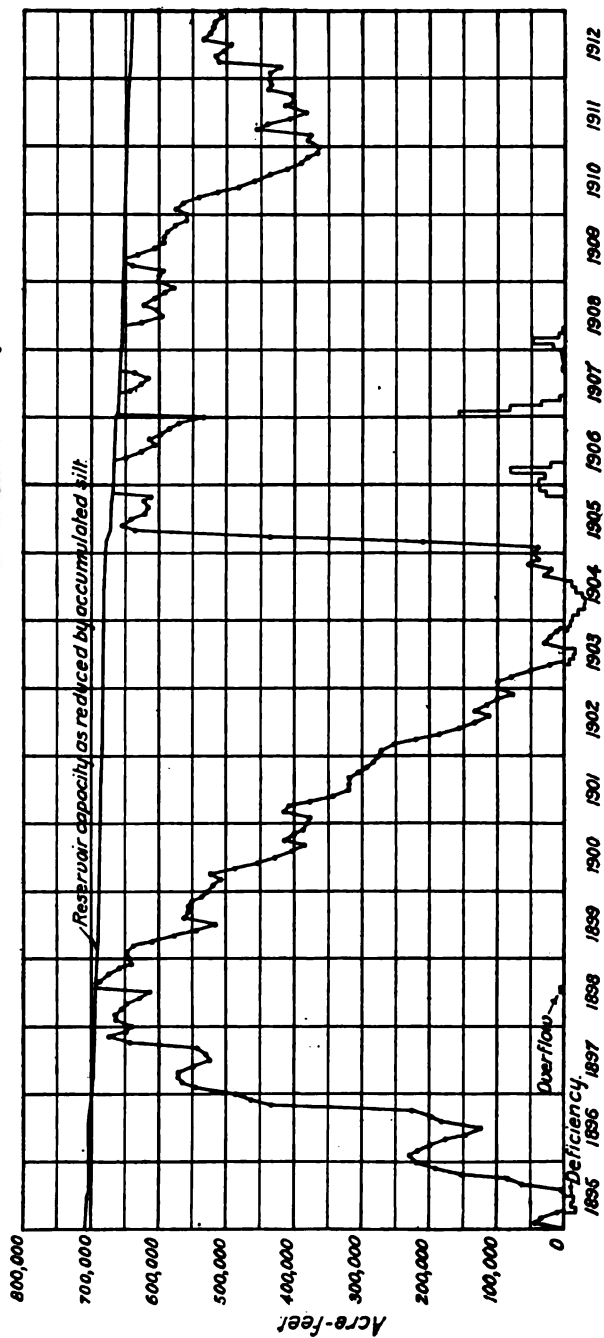


Diagram No. 7. San Carlos Irrigation Project.

122. Referring to "Comments on Mr. Olberg's report" in that appendix, the board believes that the damage to the agency will not exceed \$200,000.

123. In the brief submitted by the Arizona Eastern Railroad Co. to the Secretary of the Interior in 1909, in the matter of their application for renewal of right of way through the reservoir and dam sites, the damage to their property that would result from the building of a dam at San Carlos was described as follows:

The actual cost of building a new line to avoid the water line of the proposed reservoir involves the construction of 12.6329 miles of main line and 1.7045 miles of siding, which, after allowing full credit for the value of the material recovered from the present track and full value of material recovered from the two steel bridges, will amount to \$680,190.94.

The estimated increased cost of operating the new line after it has been completed, due to increase of maximum grades, rise and fall, curvature, etc., will amount to \$67,649.55 yearly, which annual outlay capitalized at 5 per cent gives an equivalent money investment of \$1,352,991, to which add cost of construction, \$680,190.94, gives a total of the damage which will be suffered by the railroad company of \$2,033,181.94.

The estimate of the cost of reconstruction of this line was made upon an actual survey and is extremely conservative; and the estimate of increased cost of operation was calculated by well-recognized formula.

124. The relocated line referred to as then surveyed is not high enough at all points to clear the maximum flow line at elevation 190 feet, but the change required to put it above the flow line will not increase the cost. Only the actual cost to the railroad of reconstructing the line should be paid; and the board believes that this cost will not exceed \$680,191. The board doubts whether the cost of operation of the new line will exceed that for the present line; nor is it convinced of the correctness of the method employed by the railroad in computing this increased cost. According to the company's figures, the present line has an equivalent straight level length of 14.5762 miles, while the new line has an equivalent straight level length of 14.3881. On the same basis of operating cost the new line would be slightly less expensive to operate than the present line. But the railroad calls the new line "mountain line" and the present line "valley line," and uses a greater operating cost per mile in the former than in the latter case. There is no such difference in the character of the country traversed as to warrant the distinction implied by the words "valley" and "mountain." The board has, accordingly, allowed nothing for increased cost of operation.

125. The act (vol. 28, Stat. L., p. 668) under which the railroad line was constructed across this reservation contains the clause that Congress shall have at all times power to alter, amend, or repeal this act and revoke all rights thereunder. Whether or not, under strict legal construction, this would release the United States from payment of the cost of relocating the line, the board believes that, as a matter of equity, the railroad ought to be reimbursed for the necessary outlay involved therein; but it also believes that if the United States finds it advisable to establish a reservoir at this site, such as to require a relocation of the railroad, the railroad would have no just claim for compensation because of increased cost of operation, even if there actually is such an increase.

DESILTING.

(Appendix I.)

126. While the observations and studies of the board indicate that the quantity of silt carried by the Gila River is considerably less than was formerly thought, it is nevertheless sufficiently great to necessitate, sooner or later, some desilting method in order to retain sufficient water storage capacity in the San Carlos Reservoir. Even though it were possible to construct a dam sufficiently high to permit the indefinite postponement of desilting, it would nevertheless be inadvisable to permanently deprive the irrigated lands of the fertilizing value of the silt. Since no lands are of inexhaustible fertility, either the river silt or some other fertilizer must eventually be applied to the land to be included in the project.

127. The desilting method suggested by Mr. Davis (First Annual Report of the Reclamation Service, p. 83), and later discussed for the Engle Dam (Third Annual Report of the Reclamation Service, p. 417, Engle Reservoir), is that of providing large gates in the dam at about stream-bed level or slightly above, through which with the reservoir empty or nearly so the flow of the stream would sluice deposits. It is elsewhere pointed out that at San Carlos provision against a series of low-flow years must be made by storage. The sluicing method is not applicable except when the reservoir is empty or nearly so. If the San Carlos Reservoir should become nearly empty and the remaining water in the reservoir, together with the flow of the stream, should be used for sluicing, the next year might begin with an empty reservoir, and if a year of low-river discharge, crops would suffer. The sluicing method is evidently better adapted for use in a country where the run-off is more uniform than it is in Arizona.

128. The board agrees with the 1905 reclamation board that "the topography of the country around the proposed reservoir is of such a nature that it will not be financially feasible to construct canals around the reservoir for flushing purposes." The impracticability of constructing such a canal eliminates from consideration a suggested plan based on a canal around the reservoir to carry all water past the dam except at such times as the quantity of water flowing in the river was greater than the amount needed for irrigation or greater than the capacity of the canal.

129. A modification of this plan would be to construct a conduit on the floor of the valley, having its upper end at a diversion dam constructed across the stream at a point just above the highest flow line of the reservoir, its lower end extending through the impounding dam. Water would be discharged into the reservoir when the flow of the stream exceeded the requirements of irrigation or the capacity of the conduit. Neither this nor the preceding method would take care of all the silt carried by the stream; the canal would care for a greater quantity than would the conduit. Either method, however, would add to the life of the reservoir. The conduit would be shorter than the canal because more nearly straight and because it would not have to extend beyond the upper end of the reservoir. The board rejects the plan for a conduit because of the danger that the conduit might become choked, because of the impossibility of

repairing damages to it without draining the reservoir, and because it would add largely to the immediate first cost. It could not be added in after years without putting the reservoir out of use for quite a period.

130. The method suggested by Mr. J. H. Quinton in his report of September 11, 1909, contemplates an excavating plant operated by siphonage, and one or more permanent conduits built on the floor of the valley, with outlet through the dam, and with manholes or standpipes at intervals rising above the surface of the water in the reservoir. The excavating plant would consist of a barge bearing a suction pipe extending to the bed of the reservoir (surface of silt deposited in reservoir), a tug to tow this barge, and a discharge pipe leading to the standpipe. The connection with the standpipe would be made through a 90° elbow, the vertical leg of which would be supported in a bearing in which the leg could turn through 360°, and this leg would extend down the standpipe a sufficient distance to cause discharge pipe and elbow to constitute a siphon. Certain of the details of this system present grave difficulties, but they need not be discussed since the system is open to the insuperable objection that even with a perfect vacuum the power exerted would be insufficient to raise and transport material through any considerable distance. The conduits would be open to the objection stated in the preceding paragraph, and to the additional one that interest on their cost would run for a long period before they were called upon to render any service.

131. The board believes that the most promising method, indeed the only practicable method, is dredging. A number of methods of conveying the dredged material from the dredge to the dam were considered: The pumping of the material through long floating pipe lines by use of relay pumps, or through shorter floating pipe lines into a permanent conduit; the transportation of the material in self-propelled barges; and the dredging and transportation of the material by self-propelled hopper dredges. In view of the average length of haul, about 4 miles, transportation of the material in bulk will probably be cheaper than the method by pumping through pipe lines. The objection to the conduit on the bed of the reservoir has previously been stated. Whether suction or ladder dredges would be the more efficient and economical is a question which it is now not thought necessary to answer. Should a suction dredge be used it is believed that the Fruhling head can be used to advantage in this material.

132. Careful consideration of the actual cost of dredging under many different conditions leads the board to the conclusion that the cost of removing the material from the San Carlos Reservoir will be approximately 3 cents per cubic yard, or including interest and depreciation about 5 cents. Not all of the 7,260,000 cubic yards carried into the reservoir on the average per year will have to be removed (see par. 93), and it is believed that only about 6,000,000 will have to be dredged. The cost of the dredging at 5 cents per cubic yard will therefore be \$300,000 per year, or on the basis of 90,000 acres irrigated (par. 153) \$3.33 per acre per year.

133. Schuyler, in his report of 1900 (S. Doc. No. 152, 56th Cong., 1st sess.), laid stress on power development at the San Carlos Dam. The dam contemplated by the board includes a means of taking

through the dam the water required for the full possible power development. In the beginning, however, only such amount of power would be developed as would be needed for maneuvering the gates and for other uses in the neighborhood of the dam. Regarding extensive power development, it appears to the board that there will be such variation in the quantity of water which can be taken through the wheels, and such range in the level of the reservoir, and therefore in the head on the wheels, that the amount of power which can be counted on continuously will be very small. There will be occasions when the reservoir is empty or when though there is water in the reservoir none will be passing through the dam, as, for example, when the San Pedro is in flood. It is not, therefore, proposed to develop power for sale to consumers, as is done under the Roosevelt project. Experience after the dam is built may show, however, that this would be feasible. With nonpropelled dredges, power developed at the dam could be transmitted and used, in conjunction with a steam electric power plant built on or near the railroad, and some reduction in the cost of desilting might thus be effected. The fall in the river between the impounding dam and the diversion dam is about 700 feet, and it is likely that sites can be found in the canyon at which power dams could advantageously be built or reaches in which the regulated stream could be diverted and carried in ditches, flumes, or pipes to points where drops of sufficient height would afford cheap electric power. Such power could be sold or used in desilting. This is mentioned merely as a possibility. The board has no information on which to base anything more definite. The most promising field for the use of electric power is in pumping ground water in the irrigated area to supplement, especially in dry years, the supply of stored water. The most promising power dam site known to the board is at "Needle's Eye," a gorge about 7 miles below the San Carlos Dam site. For description and views, see Appendix B and plates 14 to 18.

LOSS BETWEEN THE IMPOUNDING AND DIVERSION DAMS AND SUPPLY CONTRIBUTED BY THE SAN PEDRO.

(Appendix J.)

134. In the present unregulated condition of the river the run-off at the Buttes exceeds by about 11 per cent the run-off at San Carlos, the increase representing the contributions of the San Pedro and smaller tributaries. It is probable that with a regulated flow from the reservoir the yearly quantity of water that could be diverted at the main heading would also exceed the quantity released from the reservoir. However, the losses from seepage and evaporation would probably be greater in the latter case than in the former, and in high floods from the San Pedro a part of the flow would pass over the diversion dam.

135. On these accounts the board makes the assumption that to furnish a yearly supply of any given quantity to the main canal will require the release of the same quantity from the reservoir. This is equivalent to assuming that the water used from the San Pedro and thus saved to the reservoir compensates for any loss to the regulated flow that occurs from evaporation and seepage between the two dams.

DIVERSION DAM.

136. At the several sites for a diversion dam ledge rock is found at one or both abutments, but investigation has shown that toward the center of the river rock is not within practicable reach. However, for the lift desired, not to exceed 10 feet, a dam of the Indian type will answer.

137. Through the courtesy of Mr. G. S. Binckley, member American Society of Civil Engineers, the board has been able to consult the design for a diversion dam for this place prepared by the late Mr. J. D. Schuyler in 1911, and a later design prepared by Messrs. Schuyler and Binckley.

138. From a consideration of these designs and the quantities of materials required for a dam following the second design, the board is able to state that the cost of the diversion dam, including head gate and silt sluice, need not exceed \$150,000.

DUTY OF WATER.

139. In an arid country where land is plentiful and water scarce the quantity of water allotted to an acre of land should be made small, so as to enforce economy in its distribution and use.

140. Accordingly, under the San Carlos project, it is believed that 2 acre-feet per acre of the land would be the proper quantity to allot. While a little more than enough for one grain crop, and enough for cotton, olives, and some fruits, 2 acre-feet is less than enough for alfalfa and most fruits.¹ It is true that in the beginning a farmer raising crops of the latter kinds would not be able to cultivate his entire acreage. An acre of land with a water right of 2 acre-feet per acre would be considered less valuable than one with a water right of more than 2 acre-feet, for the smaller the allowance of water the more thorough and laborious the methods of cultivation required. Experience shows, however, that the best crops are produced by thorough cultivation with sparing use of water, and that over-irrigation results in "waterlogged" and "alkalied" lands. If the proposed allotment of water to these lands makes them less attractive to the speculator this may be regarded as an advantage.

141. There are other advantages. The benefits of the project will be extended to a greater number of people, and the greater quantity of land with a water right of 2 acre-feet per acre will be better security to the Government for the cost of the project than would a smaller acreage with correspondingly larger water rights.

¹ The amount of water which is required for the successful production of crops is dependent upon the climate, soil, and kind and number of crops grown. As a rule, where water is plentiful, too much is applied to the land, specially by unskilled irrigators. The most skillful irrigator obtains the best results with the smallest amount of water. Thorough cultivation rather than excessive use of water is the secret of success, and the man who attempts to save labor in cultivation by putting on additional water will usually reduce the crop production and endanger his own and possibly also his neighbor's land.

Roughly stated, the amount of water required for successful irrigation varies from 1 to 3 acre-feet per acre per annum, or an amount sufficient to cover the land from 1 to 3 feet in depth. In some sections of extreme aridity, where climatic conditions are such that crops grow during practically the entire year, this latter amount may be exceeded.

Under drought conditions, excellent crops have been raised and orchards caused to produce heavily with water carefully applied at the rate of only 1 or 1½ acre-feet per acre per annum. (Principles of Irrigation Engineering, Newell and Murphy, p. 34.)

On the projects of the United States Reclamation Service the amount of water required for a season's irrigation varies according to the best data available from 1.5 to 3.5 acre-feet per acre, the average being about 2 acre-feet per acre. (Ibid, p. 158.)

Again, all the farmers will be interested in increasing their security against drought by supplementing the stored water with water pumped from the underground supply; in lining ditches to reduce evaporation and seepage; and finally in entering upon desilting as soon as that becomes necessary—since any diminution in the supply of 2 acre-feet would be more acutely felt than would the same percentage of reduction in the case of a greater allowance per acre.

142. It should not be overlooked, however, that in average and wet years the quantity of stored water available under the project will exceed 2 acre-feet per year, and that rainfall in the Florence-Casa Grande district averages 10 inches annually.

AREA OF "INDIAN, PRIVATE, AND PUBLIC LANDS" TO BE TAKEN INTO PROJECT—CANAL SYSTEM.

143. *Public lands.*—As above stated (par. 24), there is almost no public land left within the limits of that area to which water can readily be distributed under the San Carlos project.

144. *Indian lands.*—It is a matter of undisputed history that from a time prior to the coming of the white man the Indians have appropriated water continuously from the Gila River for the irrigation of lands in what is now the Gila River Indian Reservation. The Little Gila, which branches from the main river near the eastern end of the reservation, is generally believed to be an ancient irrigation canal, enlarged by floods. It still serves as a main canal for lands on the south side of the river. Headgates have recently been placed at its source, and 30,000 acres of land irrigable under it are being allotted in 10-acre tracts to individual Indians. On the north side of the river 10,000 acres more are similarly being allotted under the New Santan ditch, which leaves the river about 11 miles below the head of the Little Gila. Water pumped from wells is also furnished to this land.

145. It appears above (par. 21) that the total area of the reservation is approximately 360,000 acres, of which, according to Mr. Olberg, over 100,000 acres are susceptible of irrigation. The total area cultivated by the Pimas, some at one time and some at another, is variously estimated at from 30,000 to 52,000 acres. Mr. Thackery, superintendent of the Sacaton School, states that the area under cultivation in October, 1913, was about 14,795 acres, but that, due especially to the putting in of the Little Gila headgates, preparations are being made to cultivate a larger area next year.

146. Messrs. Thackery and Olberg express the opinion that water from the San Carlos project should be furnished for 50,000 acres of land on the Indian reservation, being 10 acres per capita on the basis of a prospective population of 5,000, the population in 1912 being 3,996.

147. The board has assumed, however, that water is to be furnished to 40,000 acres of Indian lands, being 10 acres per capita on the basis of the present population; that of these 40,000 acres, 10,000 will be on the north side and 30,000 on the south side of the river; and that, as the land on the north side is already provided with pumped water, these 10,000 acres will be furnished only 1 acre-foot per acre yearly of stored water, while the 30,000 acres will be furnished 2 acre-feet.

148. *Private lands.*—Irrigation near Florence began about 40 years ago. In the later eighties the upper portion of the Florence Canal was constructed, followed by an extension to Picacho Reservoir, the construction of the reservoir, and a further extension of the canal to the vicinity of Casa Grande, where a few thousand acres were irrigated. The capacity of the canal near its head was about 100 cubic feet per second, which was fairly well maintained for several years, until, through various reverses and lack of funds, it was allowed to deteriorate perhaps 80 per cent. One cause of its decline is said to have been the increase in the irrigated area near Safford, which reduced the water supply for the Florence people in the same manner as the Florence Canal had previously depleted the supply of the Pima Indians. Following the decline of the Florence Canal, several smaller ditches have been built, of perhaps 30 cubic feet per second aggregate capacity, to serve lands near the river; and lately the old Florence Canal has been somewhat improved.

149. At the present time there are two organizations or companies proposing or seeking to come into the San Carlos project, namely, the Pinal Mutual Irrigation Co., and the Casa Grande Valley Water Users' Association. The former owns or controls the old Florence Canal and the Picacho Reservoir. It also claims certain water rights and a diversion dam site; and a small amount of work has been done on its proposed new canal, which was to parallel the old Florence Canal on the upper side, presumably in preference to enlarging the latter. The territory which it proposes to irrigate is not to extend beyond the Picacho Reservoir.

150. The other organization includes much of the same lands, but covers a much larger territory, extending to and beyond Casa Grande. It, too, claims certain water rights and a diversion dam site, and it has excavated a considerable portion of the earth section of a main canal which is located a little above the canal of the Pinal Mutual.

151. The professed intention of these organizations is to build canals, and in time diversion dams, in order to get what water they can pending the execution of the San Carlos storage project. The Indians' rights to water seem not to have been provided for in these plans. In the event of the construction of the San Carlos project by the Government, each company offers to transfer to the Government at cost all its rights and property. But the original cost of the existing works is doubtless in excess of their value to the Government, for the old Florence Canal is faulty in alignment and grade, and to correct and enlarge it would cost more than to make a new canal. The canal under construction by the Casa Grande Valley Water Users' Association, though perhaps not unsatisfactory in location, is too wide to best serve the Government's purpose. It is being made 40 feet wide on the bottom, to afford capacity for carrying in times of flood an excess over the immediate needs of irrigation, to be temporarily stored in small reservoirs, which are intended to be provided. But with the impounding dam at San Carlos storing nearly all the flood water, excepting that from the San Pedro, the excess width in the canal would lose practically all its value. Besides where water is so scarce and valuable as it is in Arizona, canals should be lined to reduce the losses of water, and the lined canal permitting a greater velocity could be made much narrower. However, the narrow, lined canal could occupy one side of the 40-foot excavation, there

perhaps made a little deeper, and the remainder could be refilled to serve as a roadway, all within the present right of way.

152. The two claims to diversion dam sites amount only to applications therefor, neither of which has yet been granted by the Government. The lower site, now claimed by the Pinal Mutual, would, at this time, be chosen by the board in preference to the other, partly for the reason that its use would obviate the costly rock cut required to extend a canal to the upper site. But the relative elevations are such as to permit the use of either diversion site in connection with either canal.

153. A portion of the land in any irrigation district is pasturage, fallow lands, corrals, etc., unirrigated; this portion being estimated by some engineers at as much as 25 per cent. The board believes that in this case it would be proper to increase by $12\frac{1}{2}$ per cent the area to which the assumed minimum annual water supply would furnish 2 acre-feet per acre. It is explained below that, assuming the canal and main laterals to be lined, the loss of water between the diversion dam and the land, Indian and private, ought not to exceed 20 per cent. Allowing, therefore, a loss of 20 per cent between the diversion dam and the land, the assumed annual supply of 200,000 acre-feet would provide 160,000 acre-feet at the land, which at 2 acre-feet per acre would irrigate 80,000 acres. Increasing this 80,000 acres by $12\frac{1}{2}$ per cent, as explained above, gives a gross area of 90,000 acres. Of these 90,000 acres, 35,000 acres (the equivalent of 35,000 acres) would be Indian lands (par. 147), and 55,000 acres would constitute the private-land district. In the above, the 200,000 acre-feet at the heading is divided between Indian and private lands in the proportion of 77,778 and 122,222 acre-feet, respectively, which is the same as that existing between the gross acreage in the two cases; or as 35/90 to 55/90. The cost of those items of the project which are common to Indian and private lands (par. 168), should be divided in this proportion (par. 169); which, being based upon relative amounts of water furnished, would be unaffected by the number of acres of land, Indian or private, to which the allotted shares of water might be at any time applied (pars. 213, 214). The irrigation of the private lands will result in a certain quantity of water becoming available either at the surface or in wells on the reservation. It is impracticable to estimate the amount of this return flow, though on account of the high duty of water assumed for this project, its percentage will be less than is usually counted on. Nor can it be known in advance whether this water will be of as good quality as the water originally applied. On account of these uncertainties the board does not include any return water in the supply to be furnished by the project to the Indian lands.

154. The question of the rights of the Indians and whites to water from the Gila is referred to elsewhere in this report.

155. Efficiency and economy require that, with soil everywhere equally adapted to irrigation, the project area should be confined, as far as is practicable, to lands near the river, not only to lessen the losses in transmission, but to make available for use again a greater amount of return water than would result from the irrigation of distant areas; as it is reasonable to suppose that the quantity recovered from near-by lands would be greater than from distant lands.

It would also be advantageous to the Government to have the water return to the river near the upper end of the reservation. The board therefore recommends that water from the San Carlos project in excess of that required for the Indians, be confined as far as existing water rights, if any, will permit, to the area north of the Santa Cruz Wash; or, more specifically, to the area limited on the south by the south line of township 6 south, range 8 east, and the diagonal line extending from the southwest corner of the same township, northwest to the Sacaton Mountains; and that within this area it be applied to such lands seeking water as are best adapted to irrigation. The above area amounts to upward of 80,000 acres.

156. *Quality of lands and waters.*—In relation to the quality of the land¹ and waters in this district, the board invites attention to the letter of Prof. R. H. Forbes, director of the Agricultural Experiment Station, University of Arizona, dated July 29, 1913, copy of which will be found in Appendix K and from which is quoted the following:

* * * * *

In general, the soils of the Casa Grande Valley are exceedingly well graded naturally, entailing minimum expense in leveling for irrigation. They range in physical character from gravelly loams, at higher elevations, to somewhat heavy clays, usually in the valley bottoms. In a general way, it may be stated that in physical disposition and character the soils of Casa Grande Valley resemble those of the Salt River Valley.

* * * * *

Summing up, therefore: The soils of the Casa Grande Valley are physically desirable, but, generally speaking, contain noticeable, and sometimes serious, amounts of black alkali which it would be well to consider in general measures affecting the welfare of the district.

2. The well waters vary greatly in character, those along the Gila River being for the most part white alkaline in character, while those at a distance from the Gila River are for the most part black alkaline in character. A number of instances are observed where either black or white alkalies are contained in injurious excess; in other cases they are not contained in any damaging quantity. In cases of a large general development of the ground waters of the district through single or harmonious agencies, these waters should be so combined in irrigating that sodium carbonate and calcium sulphate contained may react in a manner improving the quality of the water.

3. In the case of river waters, the black alkaline flood waters and the calcium sulphate low flow, more especially of the Gila River, will unquestionably benefit by mixture in a storage reservoir.

4. Aside from discussions more or less theoretical in character, the history of the district for the last 20 years shows that for the most part, wherever abundant irrigating water is available, large and profitable crops may be grown.

157. The board has received from owners of lands in the Florence-Casa Grande district, offers to enter an aggregate of 41,000 acres under the San Carlos project, upon condition that the cost of the

¹ * * * The soils of the arid and semiarid regions are largely the results of disintegration of rock. Many of them have not been completely washed by copious rains during their formation and contain large quantities of soluble mineral salts. Some of these salts, especially in limited quantities, are beneficial and necessary for the growth of vegetation, while others are harmful, and in sufficient quantities will prohibit its growth. Sodium carbonate, commonly known as black alkali, is the most detrimental of all the alkali salts to plant growth. The exact action of alkali on a plant is not clearly understood, its effects, however, is to destroy the root tissues near the surface of the soil and leave the plant to die for lack of food and moisture. On account of the action of alkali being near the surface it is essential that any accumulation of salts in the top stratum of soil be avoided. * * *

In their natural state the alkali salts are distributed more or less uniformly through the soils, frequently extending to considerable depths. When water is applied to the land, the soluble salts are dissolved. As the process of evaporation goes on from the surface of the soil and waters charged with alkali are brought up by capillary action there is a gradual accumulation of salts on or near the surface until finally the soil is unfit for the growing of crops. If the soil becomes saturated, or in other words, if the water plane is brought up near the surface, the capillary action in drawing water to the surface and consequently the rate of evaporation and deposit of alkali is increased. (Principles of Irrigation Engineering, Newell & Murphy, p. 138.)

project does not exceed \$75 per acre. The forms used in making these offers are as follows:

OFFER TO FLEDGE LANDS FOR SAN CARLOS RESERVOIR PROJECT.

I, the undersigned, being at present the owner of the following-described lands situated in Pinal County, State of Arizona, _____, for the purpose of showing the feasibility of the San Carlos Reservoir and irrigation works therefrom, offer to cause my above lands to become subject to a lien of not to exceed \$75 per acre for proportionate shares of the cost of construction of said irrigation works by the United States Government, and to so do under such terms and conditions as may be finally imposed by the United States as an incident to construction thereof to irrigate said lands.

Signed and sealed this _____ day of _____, 1913.

[T. S.]
[L. S.]

(Affidavit acknowledging execution.)

PLEDGE OF LANDS FOR SAN CARLOS RESERVOIR PROJECT.

I, the undersigned, a member of the Casa Grande Valley Water Users' Association, being owner or entryman of the following-described lands, situated in Pinal County, State of Arizona, to wit: _____, hereby express my willingness to cause my above-described lands to become subject to a lien of \$75, or so much thereof as may be necessary, as and for the proportionate share of the cost of construction by the Government of the United States of the San Carlos Reservoir project, and a distributing system thereunder, it being understood that said lands are to receive water for irrigation purposes under such rules and regulations as the Government of the United States may impose.

Signed and sealed this _____ day of _____, 1913.

(Affidavit acknowledging execution.)

Other owners equally desirous of obtaining water have refrained from making this tender in advance of the time when it would be possible to enter into contract with the United States, for fear of clouding their titles or embarrassing themselves in work they have under way or in prospect. About 24,000 acres of the lands tendered lie outside of the area to which, as above explained, the board believes water from the San Carlos project should be restricted.

158. There are irrigation wells in use near Florence and Casa Grande, and, as already pointed out, on the reservation lands on the north side of the river opposite Sacaton. Water from the well at the Sacaton Agency has been used for irrigation for a number of years. As the board has not proposed that well water shall be used exclusively anywhere in the project, there is no need to go very deeply into the question whether land so irrigated can continue to produce indefinitely. Well water would lack the fertilizing value of river water, and there would be a greater objection to its exclusive use than there would be to the continued use of water which by passing through the reservoir had deposited five-sixths of its silt content. The quality of the ground water varies with the location of the wells, but there is sufficient evidence to show that at least in some wells in the Gila Valley the water is less alkaline than is the river water at very low stages. The board inspected crops of vegetables, corn, grain, and cotton at the experiment farm, Sacaton, growing in ground on which no water except that from the agency well had been used for six years. There was some appearance of alkali, but the farmer stated that all crops had done well during the six years in question. It appears from the records that alfalfa,

Indian corn, sorghum, Egyptian cotton, Bermuda onions, and other crops; and pears, apricots, figs, pomegranates, dates, and other fruits have been grown successfully there with well water alone. For cotton, 2.7 acre-feet of well water per acre was applied in 1910; 2.52 in 1911; and 2.06 in 1912. On Peruvian alfalfa 3.6 acre-feet was used.

159. Whatever might be the ultimate effect of using well water alone, no bad effects would follow the proper use of well water in conjunction with or supplementary to the river flow or stored river water. Some who have had experience with well water prefer to use it in conjunction with river water rather than to use river water alone. Apart from the question of alkalinity, the river water at times contains so much silt as to make it unsuitable for use on young alfalfa; and in midsummer it contains large quantities of seeds; while on the other hand, well water is warmer than river water during cold weather. This subject is discussed in the letter of Prof. Forbes above referred to, copy of which appears in Appendix K.

160. *Canals.*—Considering the acreage irrigable and the distribution of the tracts of land which would naturally be taken into the project, a main canal should extend for a length of about 14 miles from the heading to a point about 5 miles southwest of Florence, where it should divide into two branches, viz: The "Pima branch" which would run westerly along the ridge past the Casa Grande ruins to the Indian reservation; and the "Picacho branch" which would run in a southerly direction to the Picacho Reservoir. The Pima branch would be about 8 miles long; the Picacho branch about 7 miles. The Picacho Reservoir would be of value as providing some storage and as facilitating the operation of the system. The Pima branch would lie along the ridge referred to in order to serve private lands on either side, as well as to convey water to the reservation.

161. The board proposes that the Indians' share of the stored water shall be conveyed in a canal rather than in the bed of the river, in order to save a loss of water and to serve private lands. This advantage will outweigh the extra cost involved. At the same time, as explained in paragraph 171, there is need for the construction of a diversion dam on the reservation.

162. The cost of the main canal and the Pima branch should be shared between the reservation lands and the district lands (par. 153). The Picacho branch should be entirely at the expense of the private lands.

163. To line main canals and distributors will effect a considerable saving of water, and will thus enable the district to be larger than it otherwise could be. The reduction in the cost of the project per acre due to the increase in acreage will offset the increase in cost due to lining the canals. The lined canal has other advantages besides reducing loss from seepage. It prevents swamping of adjacent lands with the resulting increase of alkali; due to the greater velocity permissible and the consequent reduction in width, it reduces evaporation losses; it is less dependent upon topography; the need and cost of drops is reduced; it requires less excavation and occupies less land; and it reduces the cost of operation and maintenance by preventing plant growth and the deposit of silt. Aside from considerations of first cost to individual landowners is that

of public policy demanding prevention of unnecessary waste of water in the arid regions. It is estimated that with lined main canals and distributors the loss between the diversion dam and the land irrigated will not exceed 20 per cent.

164. The maximum capacity of the main canal, to carry the "peak of the load," would need to be 1,000 second-feet at the head, diminishing as tapped by laterals. A smooth cement-lined canal on a grade of 1 in 2,000, 18 feet wide on the bottom and with side slopes of 1 on 1, with water 6 feet deep, would have a velocity of about 7 feet per second and a capacity of about 1,000 second-feet. Its cost, including concrete lining 4 inches thick on bottom and sides, together with the necessary gates and bridges, is estimated at about \$36,000 per mile.

165. The Pima branch canal, about 8 miles long, would need to have a maximum capacity of about 500 second-feet at the head. A steep grade can be given it, producing high velocities, and permitting the cross section to be small, averaging about 5 feet on the bottom, side slopes 45°, and water 5 feet deep. It is estimated that its cost, with concrete lining 3 inches thick, together with the necessary structures, would be about \$15,000 per mile.

166. Beyond the above canals, the elements of the distributing system can not be determined in advance of knowledge of the exact territory to be irrigated, which latter will depend on the will of landowners, and possibly on adjudication of water rights or claims. It may be said, however, that the topography is particularly favorable to cheap construction. This, and the existence of some canals which would doubtless be useful in the new system, is expected to make the cost of an unlined distributing system, aside from the main canal and its Pima branch, not more than \$7 per acre, including structures. An additional \$10 per acre would provide a sufficient concrete lining for these subsidiary canals and ditches.

ESTIMATE OF COST OF PROJECT.

167. The reclamation law (act of June 17, 1902) requires that the cost of construction of any given project shall be returned to the reclamation fund by the owners of land thereunder in not to exceed 10 annual installments, the number of payments and the time when such payments shall commence to be determined by the Secretary of the Interior. It seems to the board that to require that payment for the San Carlos project should be made in 10 years is to place an undue burden upon the first irrigators on whom will fall greater outside expenses than on their successors, and the board has therefore assumed that payment for the project is to be made in 20 equal annual installments. Under the reclamation law interest is not charged, but the board sees no reason for recommending that interest be not charged on money advanced by the United States for that part of the San Carlos project which is for the irrigation of private lands. In the following estimate, interest at 3 per cent compounded annually is included.

168. For the items of the project that relate both to Indian and to private lands, the estimated cost is as follows:

Impounding dam, 263,000 cubic yards, at \$8 (par. 79).....	\$2, 104, 000. 00
Damage to San Carlos Reservation.....	200, 000. 00
Moving Arizona Eastern Railroad.....	680, 191. 00
Diversion Dam near Florence.....	150, 000. 00
Main Canal, lined, 14 miles, at \$36,000.....	504, 000. 00
Pima Branch Canal, lined, 8 miles, at \$15,000 ¹	120, 000. 00
Engineering and contingencies, 15 per cent.....	3, 758, 191. 00
	563, 729. 00
Interest during construction, at 3 per cent for two years.....	4, 321, 920. 00
	259, 315. 00
Total to be prorated between Indian and private lands.....	4, 581, 235. 00
Cost per acre, assuming a total of 90,000 acres, but not including cost of distributing systems.....	50. 90

169. The partial total, \$4,581,235, is to be divided between Indian and private lands in the proportion of 35/90 and 55/90, making—

Indian share.....	\$1, 781, 591
Private land share.....	2, 799, 644

170. *Additional and total cost to United States for Indian lands.*—In addition to the sum of \$1,781,591, above, will be the cost of some means of carrying flood water to the lands under the new Santan ditch, and the cost of constructing a certain part of the distribution system on the reservation lands on the south side of the river and of lining certain of the distributors and main laterals on the south and possibly also on the north side.

171. Stored water might be gotten to the new Santan ditch by building a canal about 31 miles long on the north side of the river from the diversion dam; by building a diversion dam at the reservation, either at the Santan ditch or at the Little Gila heading, with a canal in the latter case, about 11 miles long on the north side; or by an aqueduct or siphon at the reservation. A diversion dam on the reservation would also intercept a portion of the return flow from the private-land district. (Par. 153.) Again there will be at times water running over the diversion dam above Florence; and finally, a lower diversion dam would be available for the diversion of water to the Indian lands on either side of the river, in case of a breach in the main canal or in the Pima branch. An aqueduct might be considered in case it were in contemplation to construct a permanent bridge across the river near Sacaton. A means of getting stored water to the north side will not become a necessity until the storage dam has been constructed and water begins to be impounded. The estimated cost of any satisfactory means of accomplishing the purpose under discussion will be taken as the same as the estimated cost of the upper diversion dam, viz, \$150,000.

172. The board adopts \$12 per acre on 35,000 acres, in all, \$420,000, as a rough estimate of the cost of the work referred to on the distribution system.

¹ The Pima Branch Canal is included here and the Picacho Branch omitted, as private lands will be served under the former, while no Indian lands will be served under the latter.

173. The estimated total ultimate cost of the San Carlos project to the United States for the Pimas will then be—

As above.....	\$1,781,591.00
Distribution system:	
35,000 acres, at \$12.....	\$420,000
Lower diversion dam, etc.....	150,000
Engineering and contingencies, 15 per cent.....	85,500
	655,500.00
	2,437,091.00
Cost for each of 30,000 acres on south side of river with full supply of water.....	69.63
Cost for each of 10,000 acres on north side of river with half supply of water.....	34.82

174. As in the case of the projects under the reclamation law, the title to and the management and operation of the reservoir and the works necessary for its protection and operation should remain in the United States, and so long as the Indians remain wards of the Government, the United States should also retain control of the diversion dam above Florence and the main canal and the Pima branch.

175. Operation and maintenance of the system on the reservation and the Indians' share of the expenses of administration and of operation and maintenance of the elements common to the use of both the Indians and the district may be taken at \$1.50 per acre per year, or \$60,000 a year. The board assumes that this will be collected from the Indian irrigators.

176. *Additional and total cost for private lands.*—The cost of the Picacho branch of the main canal and of the distribution system for the 55,000 acres of private lands to be taken into the project, including the lining of the main distributors and larger laterals will be assumed at \$17 per acre. The estimated total cost to private lands will then be—

As above.....	\$2,799,644.00
Distribution system, 55,000 acres, at \$17.....	\$935,000
Engineering and contingencies, 15 per cent.....	140,250
	1,075,250.00
	3,874,892.00
Per acre.....	70.45
177. If the \$70.45 be extinguished in twenty equal annual installments, without interest, each installment would be.....	3.52
With interest at 3 per cent compounded annually, each installment would be.....	4.74

178. The board has assumed that the distribution system will be constructed by the district, not by the United States, and that the United States will therefore not advance the money for it. It should be observed, however, that there is no objection to the United States constructing it and under certain Reclamation Service projects it has been found advisable for the United States to do so. The figures remain practically the same under either supposition, since in one case interest on the cost is less and in the other it is reasonable to assume that much of the actual labor will be done by the farmers themselves. The total probable cost per acre per year for 20 years, including interest at 3 per cent compounded annually, would accordingly be \$4.74.

179. The cost of operation and maintenance will be taken at \$1.50 per acre per year, of which about two-thirds would be paid to the district organization and one-third to the United States.

180. The board has estimated that at present prices, the cost of desilting would be about \$3.33 per acre per year. It will probably be less by the time desilting becomes advisable. As a matter of maintenance of reservoir capacity, such work will not be necessary until long after the construction charges have been fully paid.

181. To sum up, the yearly total of payments on private land would be \$6.24 per acre for 20 years; then \$1.50 per acre until desilting charges begin; and afterwards not more than \$3.33 per acre additional, or \$4.83 per acre.

RIGHTS TO GILA RIVER WATERS AND CLAIMS THERETO.

ALTERNATIVE PROJECTS.

182. Along the Gila above its confluence with the Salt, the principal irrigated areas are near Sacaton, Florence, Safford, and Guthrie. About 15,000 acres are under cultivation by the Pima Indians near Sacaton; about 3,000 acres by whites near Florence; 25,000 near Safford, and 7,000 near Guthrie.

183. Unquestionably the Pima Indians were the earliest appropriators of water from the Gila, and since before the advent of the white man they have continuously applied water to a beneficial use in the irrigation of land on or near the present reservation. Just how extensive are their rights to water can be known only as the result of an adjudication. The board was advised by an attorney of the Indian Bureau, that, in his opinion, the Indians not only have a prior right to the quantity of water required for the average acreage they have had under irrigation (about 15,000 acres as stated by Mr. Thackery), but that the United States acting for the Indians probably has the right to take as much of the flow of the stream as may ever be required for the proper use of the Indians, and that private rights can not vest except to the flow of the stream in excess of that required for the Indians. The acreage suggested by Mr. Olberg of the Indian Service as that which will ultimately be required for the Pimas is 50,000, being 10 acres per capita for an assumed prospective population of 5,000. For such an area it is probable that the flow of the river would be needed up to a discharge so great as to practically require all waters, excepting in times of floods of some magnitude, to pass all lands now irrigated above the reservation.

184. It is useless to speculate on the extent and priority of the rights claimed at Guthrie, Safford, and Florence. But it is apparent that the extent of existing rights, if there are any such rights, especially rights near Florence, will have a very important bearing upon the advisability of this project. If in the district to which the board recommends that the project be confined there are lands having water rights, and the owners refuse to relinquish these rights, the project must deliver free to these lands the water to which they are entitled. Similarly, if there is land possessing water rights outside the district, these rights must be satisfied in the same way. To

have to furnish any considerable quantity of water free will reduce the area of lands in the project and correspondingly increase the cost per acre.

185. From the beginning the board realized that the question of advisability or inadvisability would very likely rest largely on the quantity of water, if any, that would have to be delivered in satisfaction of prior rights, and at its first meeting the board submitted the following letter:

PHOENIX, ARIZ., November 19, 1912.

From: The board of engineer officers, appointed under section 2, Indian appropriation act approved August 24, 1912, to report on advisability of storage reservoir at San Carlos, Ariz.

To: The Secretary of the Interior.

Subject: Adjudication of water rights on Gila River and filing on unappropriated water at San Carlos.

SIR: The board is arranging for the collection of physical data necessary for the determination of the questions submitted to the board. One point, however, on which the advisability of such storage of water, and the utilization thereof, is very largely dependent can not be determined definitely by the board without legal assistance. This point is, How much of the flow of the Gila River is legally available for storage in the proposed reservoir? It is obvious that unless this information can be had it will be impracticable to determine the area of land which can be irrigated from such stored water. To obtain this information it is necessary to know what prior rights of irrigators below and above the dam must be satisfied before any water can be stored in the reservoir. There are numerous canals which take water from the Gila in both localities. An adjudication of all these rights is therefore essential.

2. It has been asserted that the Pima Indians have a water right prior to any others in the valley. If this is true and the amount of such prior right is determined, this right will, of course, be absorbed in any storage project undertaken chiefly for the benefit of these Indians. Under agreement with the owners, other water rights pertaining to lands lying below the reservoir may also be absorbed in the storage project. But the rights below the reservoir, the owners of which decline to enter into an agreement with the United States, must be satisfied by passing sufficient water through the dam for that purpose.

3. The board has not been able to find that the surplus and unappropriated waters of the Gila and its tributary streams above the site of the impounding dam and a diversion dam across the Gila at a point about 12 miles above Florence have been filed upon so as to prevent further encroachments upon the flow of the river by private parties.

4. In view of the fact that the discharge of the river at the San Carlos Dam site is small at best, and every particle of water that can be brought to the reservoir will be needed for the purposes described in the act, it appears to the board essential that such filing as is referred to in the preceding paragraph should be accomplished at the earliest possible moment.

5. In view of the facts above given, it is recommended by the board that the Department of Justice be requested to assign a United States district attorney or assistant attorney, well versed in laws and practice of water use, to carry out the following recommendations:

First. To file upon all surplus and unappropriated waters of the Gila River and its tributaries above the San Carlos Dam site, on behalf of the project.

Second. To proceed as rapidly as possible to obtain an adjudication of all water rights in the Gila River.

6. As it is recognized by the board that the adjudication desired may take several years before its definite conclusion, the board further recommends that the attorney assigned to carry it out be requested to make a preliminary examination of existing and dormant rights on the Gila, both above and below the dam site, and to furnish to the board as soon as possible an opinion on which the board can base a safe conclusion as to what part of the flow of the Gila River a court will decide is available for the project. The information collected in forming this opinion can, of course, be utilized in the prosecution of the adjudication.

Very respectfully,

W. C. LANGFITT,
*Lieutenant Colonel, Corps of Engineers,
Senior Member of the Board.*

186. The board has received no definite advice as to "what part of the flow of the Gila River a court will decide to be available for the project," but learns that preliminary steps have been taken toward securing the adjudication recommended. In the opinion of the board it is also important that further diversion above the Pima Reservation be prevented pending the adjudication and that all surplus flow of the river remaining from the adjudication be reserved in a proper legal manner for the use of the project; or, if the project be not undertaken, for use of the Pima Indians, a sufficient amount to irrigate 35,000 acres of Indian land with a duty of water of 2 acre-feet per acre per year.

187. With respect to lands claiming water rights and lying within the district to which the San Carlos project should be confined, the board believes that a condition precedent to the entry of such lands in the project should be the relinquishment of such claims, and that the lands should be entered on the same basis as lands for which no water rights are claimed.

188. The following additional conditions should also be subscribed to by all private land owners in entering into a formal contract with the United States for the carrying out of a joint project:

Private land to enter the project on the same basis as Indian land.

The equivalent of 35,000 acres of Indian land to be entered (30,000 with full water rights, 10,000 with half rights), and 55,000 acres of private land. The division of cost to be as set forth in this report, and actual cost to be paid whether more or less than the estimated cost, including interest at 3 per cent, compounded annually.

The unit of entry to be 80 acres. Between time of entry and two years after completion of project every entryman owning more than 80 acres shall sell the excess, or in the event of failure to do so the United States to have the right to sell the excess, turning over net proceeds of sale to the owner.

Entrymen to so arrange with their creditors, if any, that amounts due the United States for cost of construction, operation, and maintenance, including interest thereon, shall be a first lien upon the lands to be entered.

The control and management of the reservoir, diversion dam, main canal, and Pima branch shall remain with the United States as long as the United States thinks desirable.

The United States shall be the judge when desilting should begin, and the contract should provide for repayment of the cost of desilting and of operation and maintenance.

189. *Alternative projects.*—In case, as the result of adjudication, such a quantity of water is decreed to private land that the project becomes prohibitively expensive as a project for the irrigation of Indian and private lands, there remain two methods of providing irrigation water for the Pima Indians, viz, a storage project for the Indians alone and a flood-water project with or without a pumping reserve. In the discussion of these projects the board is handicapped by lack of accurate knowledge as to the quantity of water required to satisfy rights other than those of the Indians. In the storage project it will be assumed that the total quantity to be furnished yearly from the reservoir supply for all purposes is 100,000 acre-feet—87,500 for the Indians and 12,500 for private lands; that 250,000 acre-feet of capacity will be required in the reservoir for water storage and 187,500 acre-

feet for 50 years of silt accumulations. This will necessitate a dam 155 feet high. Making a reasonable reduction in the item of flowage damage in the estimate of the larger project, assuming the cost of a diversion dam at the reservation to be the same as that of the one figured on above Florence, and omitting the cost of the canals contemplated in the larger project, the cost will be about \$90 per acre. Desilting, when desilting became necessary, would amount to about \$8.50 per acre per year. The board considers these costs prohibitive.

190. In the flood-water and pumping plan a diversion dam would be constructed at the head of the Little Gila or at the Santan heading, or possibly one at each place, to irrigate lands on both sides of the river.¹ The quantity of river water available would depend, as stated above, on the result of an adjudication. Such experience as has been had with wells is favorable to the assumption that underground water within easy reach of pumps is available on both sides of the river; but there is no present means of knowing whether the underground supply will continue to furnish indefinitely 2 acre-feet per acre yearly for 40,000 acres of land. It is necessary, however, to estimate on a well and pump system capable of this duty on account of the long periods, sometimes several months in duration in which under existing conditions, which are assumed to continue, little or no water is obtainable from the river. The effect on cost to result from using river water in conjunction with such a pumping system is, then, merely to reduce the amount of fuel used. It must not be overlooked, however, that river water is superior to well water.

191. It is assumed that the perpetual right to 1,000 horsepower from the electric power plants of the Roosevelt project, to which the Santan project is entitled, is sufficient to operate the eight wells already completed as well as the eight additional 10-second-foot capacity wells required for 10,000 acres, and also the pumping plant of the Indian school. In addition to the construction charges already assessed against the Santan project, the complete system will include the cost of eight 10-second-foot wells at about \$15,000 each, or \$120,000; and the cost of a diversion dam below the intake of the Santan ditch if such is required. The total cost will be obtained by adding to

¹ The following is taken from report of C. R. Olberg, superintendent of irrigation, dated Sept. 27, 1913, addressed to the Commissioner of Indian Affairs:

"The irrigation of the Sacaton (Santan) project is effected by conveying water from the Gila itself through a large flood canal, and during periods of drought in the Gila of using a supplementary supply of water obtained from pumping plants. At present there are eight pumping plants completed and two more started, but the number of these pumping plants could be extended considerably with probably a proportionate increase in the amount of water available. Also, the capacity of the flood canal is large, being about 300 second-feet, so that it is evident that an area considerably larger than the 7,000 acres allowed for the present complete system could be provided."

Mr. Olberg points out that there is a large area of irrigable land on the south side of the river and proceeds:

"It will thus be seen that there are ample good lands to give each of 5,000 Indians 10 acres of irrigable land."

"The additional water for the balance of the land to be irrigated, assuming that only the 100,000 acre-feet could be obtained from the flow of the river for the Indians' share, could be secured by pumping."

"All that portion of the valley of the Gila which is covered by the Pima Reservation is underlaid by deep strata of fine water-bearing gravel, and a large quantity of water can be obtained from this storage."

"The expense of pumping will not be at all prohibitive, especially when it is considered that, for a longer or shorter period each year, gravity flood water from the Gila will be available."

"The preceding statement of the water resources would indicate that it is entirely within the bounds of reasonable expectation that water can be provided for 10 acres each for all the Indians on the Pima Reservation. While I have here considered the number of Indians who would expect allotments upon this reservation at 5,000, the actual number, as given in the commissioner's report for 1912, is 3,996. Assuming the total area of land which it will be necessary to supply with water as 50,000 acres provides what means an ample allowance for increase in numbers or for unenumerated individuals entitled to allotments on this reservation."

the amount already expended the cost of the additional wells and the dam if needed, and the cost per acre will be obtained by dividing the total by 10,000. The cost for operation will be small because of the power from the Roosevelt project. The annual cost per acre will be the annual installment of construction, interest, and depreciation costs, plus cost of operation; but the board does not attempt to put the annual cost per acre for the Santan project into figures, as is done for the 30,000 acres on the south side.

192. For the 30,000 acres to be irrigated on the south side of the river, called the Sacaton project, there will be required 40 wells, costing about \$600,000; a power plant of about 1,350 kilowatts capacity, costing about \$135,000; 40 miles of transmission lines, costing about \$80,000; a diversion dam at the head of the Little Gila, costing about \$150,000; and a distribution system, costing about \$12 per acre, or \$360,000. The total estimated construction cost is therefore \$1,325,000, or \$44.17 per acre. If this amount is assumed as returnable in 20 annual payments, and if interest at 3 per cent compounded annually is added, the annual installment of construction cost per acre will be \$2.97.

193. The amount of electric power per year for pumping on the 30,000 acres may be taken at about 4,200,000 kilowatt hours, and the cost as about $1\frac{1}{2}$ cents per kilowatt-hour, or a total of \$73,500; but since there will be a saving of fuel when river water is used, the annual cost may be taken as about \$63,000. The depreciation on the elements of the project may be taken as averaging about 5 per cent, except for the diversion dam, which it is assumed will not deteriorate; and the annual charge for deterioration will therefore be 5 per cent on \$1,175,000, or \$58,750. The operation for the system, not including power, may be taken as \$1 per acre per year, or \$30,000 for the project. The total annual cost for operation and for depreciation is therefore \$151,750, or \$5.06 per acre. On this basis the Sacaton project will be charged \$8.03 per acre per year for the first 20 years, and thereafter \$5.06 per acre per year.

194. In the description of the San Carlos Reservoir project elsewhere given, it was stated that there was to be included in the project the 10,000 acres of the Santan project, with one-half water right in stored water and with present power right and use of well water, and 30,000 acres of land on the south side of the river; and that the estimated cost chargeable to the Indian lands was \$2,437,091. If this is to be repaid in 20 equal annual installments and if the interest at 3 per cent compounded annually is added the annual installment per acre on the south side will be \$4.68, and for the 10,000 acres on the north side \$2.34.

195. For the 10,000 acres on the north side there must be added the construction charges assessed against them for the work already done, less the value of the power in excess of that necessary to operate 8 wells. The acreage on the north side may be increased by the construction of 8 additional wells to use the power for which the Santan project has a right. On account of the uncertainties in regard to what is the proper basis of settlement for the 10,000 acres, the board assumes that the one-half right will be charged for operating the storage works and for desilting, only one-half the average cost per acre, and that the charges for such elements of the storage and distribution system as are subject to deterioration should be similarly distributed.

196. For the 30,000 acres on the south side, the yearly cost can be more definitely stated. The operation and maintenance of the reservoir and main canals is estimated at \$45,000 for 90,000 acres, or \$0.50 per acre. The operation and maintenance of the distribution system for the south side lands may be taken as \$1 per acre per year. The total annual charge for operation and maintenance for the 30,000 acres will therefore be \$1.50 per acre. For 20 years the charge against the land on the south side will be \$6.18; for the remaining time until desilting begins, the charge will be \$1.50, and after desilting begins, the annual charge may be as much as \$4.83.

197. The degree of accuracy attaching to the estimate of the combined flood and well-water system is not equal to that attaching to the estimate for the storage project. The above figures, however, show that the yearly cost of the former system will exceed that of a storage project for Indian and private lands, provided the entire present flow¹ of the stream is available for the storage and none of the stored waters have to be delivered free in satisfaction of existing rights.

198. Under the supposition that the United States is entitled to practically the entire flow of the stream (par. 183), a flood-water system without either a storage or a pumping reserve could be installed. It would involve the construction of one or possibly two diversion dams on the reservation, and the necessary distribution system. Its cost on a basis of 20,000 acres irrigated would be about \$17.50 per acre.

199. It is impracticable to estimate closely what quantity of water could be caught by such a system, and not all that could be caught could be usefully applied, for on a flashy stream like the Gila a flood-water system has this essential defect that often, perhaps when water is needed most, the river may be dry, while when the river is in flood only a portion of the flow may be required or can be diverted. But possibly by such a system 30,000 to 50,000 acre-feet might be put upon the lands, or sufficient for the irrigation of, say, 20,000 acres. This would give the Indians as much water as with their primitive methods of diversion, distribution, and cultivation, they have hitherto been able to use, but is far less than is now thought to be their due. (Par. 216.)

200. Moreover, it appears advisable to point out what would result from the enforcement of the assumed right to take the entire flow of the stream. It would certainly mean depriving the irrigators near Florence of so much water as to make irrigation in that district precarious if not impossible.² For 20 years it has been known that the diversion of water near Florence was reducing the quantity of

¹ The run-off measured (and estimated) at San Carlos, is the actual present run-off, allowing, of course, for the quantity diverted at Guthrie and Safford. In view of the lack of any adjudication in which the rights of the Pima Indians have been considered, the board could not assume that irrigation at these places would be abolished or reduced in amount. On the other hand, the board's discussion of the project assumes that no diversion in excess of present ones will be permitted above the dam site, or between the dam site and the reservation.

² Should a court decide that everywhere above the reservation irrigation must cease except at times when the flow exceeded the "normal flow," the effect might be to prevent or at least greatly reduce irrigation at Safford and Guthrie. The board lacks the data necessary for determining what effect is produced at the reservation by the diversion of water at Safford and Guthrie; and has therefore confined the discussion in the text to the effect that would be produced upon irrigators at and near Florence, by the enforcement of the assumed rights of the United States to the greater part of the total flow of the stream. For "normal flow" see the Kent decision in *Hurley v. Abbott*. In the case of the larger storage project, as already indicated, the quantity of water arrived at as available for storage does not assume the cessation of irrigation at Safford and Guthrie, but does assume that there shall be no increased diversion above the dam site.

water available for the Indians below the quantity needed by them. Nevertheless such diversions have not been prevented by the United States. On the contrary, they may be said to have been encouraged, for so far from withdrawing the public lands in the vicinity from entry, the United States has allowed them to be homesteaded and even entered upon under the desert-land act which requires that for a patent to issue land must be irrigated. Bad as conditions are they are constantly getting worse, and this is one of the reasons why the board has so strongly recommended a judicial determination of water rights along this river. It also equally recommends that no further land entries requiring irrigation from the Gila River or its tributaries above the Gila River Indian Reservation be permitted and that lapsing entries be canceled and not reissued.

201. Up to this point it has been assumed that if there are rights adverse to those of the Indians, they exist above the reservation. It is by no means certain, however, that there are not similar rights in the case of lands downstream from the reservation. From whatever point of view this question is considered, the necessity of a judicial determination of rights appears at once, and it seems that this determination should extend to rights throughout the full length of the stream.

PRACTICABILITY AND ADVISABILITY OF PROJECT.

202. The board finds that the San Carlos irrigation project is entirely feasible from physical considerations.

203. The advisability of the project, as before stated, will depend on its cost as compared with the benefits to result from it.

204. The cost of the project per acre will depend upon the number of acres that can be taken under the project, and this upon the quantity of water physically and legally available.

205. The board has pointed out that the following uncertainties exist as to the water supply legally available:

(a) It is not known whether the run-off at San Carlos, as determined by the board, will continue to be available or whether additional diversions above that point will be made.

(b) It is not known whether all of the water that can be taken into the main canal will be available for lands under the project or whether a part of it will have to be delivered free to lands not entered under the project.

(c) It is not known whether a part of the water that might be taken into the main canal may not have to be left in the river to satisfy rights below the reservation.

206. Until these uncertainties are cleared up, either by an adjudication or by competent legal opinion as Congress may determine, it would be inadvisable for the United States to proceed with this project. In the following discussion, therefore, it is assumed that all of the above questions are settled in favor of the project, so that the existing run-off at San Carlos is available for use under the project.

207. Some of the benefits to result from carrying out this project and some of the incentives for the United States to proceed with it can not be expressed in dollars and cents. Thus there is the plain duty of restoring the water of which the Indians for many years have been illegally deprived; the obligation, growing out of the relation of guardian, to supply even a better system of water supply than

that formerly enjoyed in order to permit proper opportunity for development and advancement of the Indians; and finally the advantages of conserving water which otherwise would largely be lost, and of utilizing it upon these desert lands, both Indian and private, thus adding materially to the producing power of the State and providing additional profitable industries to the people.

208. Assuming the availability of the existing run-off, it is proposed to include in the project 40,000 acres of land on the Indian reservation (30,000 with full water rights and 10,000 with half rights) and 55,000 acres of private land near Florence. The cost will be about \$70 per acre in each case.

209. The board is of opinion that, considering land, climate, etc., \$70 an acre is not a prohibitive price in southern Arizona for such a water system as that contemplated in this report. Under present conditions, however, it is close to the limit.¹ As time goes on the land probably can afford to pay more.² On this account, whatever be the decision of Congress as to adopting the San Carlos project at the present time or in the near future, the San Carlos Dam site and reservoir site ought not to be given up. No railroad should be permitted to build through the dam site at a lower elevation than 200 feet above the stream, and any new railroad construction in the reservoir site or any extensive relocation of present lines ought to be permitted only upon the understanding that no compensation will be due from the United States if later these new railroad lines are forced to move because of the carrying out of the San Carlos project.

210. Under the plan of repayment proposed by the board, the cost per acre to private land, including operation and maintenance, will be about \$6.24 a year for the first 20 years, \$1.50 a year thereafter until desilting begins, and thenceforth, with desilting, not to exceed \$4.83.

211. In saying that the cost of the project is about as high as it is at present advisable to go the board of course does not mean that there would be any difficulty in making an annual profit of \$6.24 an acre on the land under this project. Land under the Florence Canal, even with its present deficient and uncertain water supply, now rents for \$5 and \$6 per year. But it must be remembered that the land

¹ Beginning about the year 1900 a cost of \$20 per acre for irrigation was considered high, but when it began to be appreciated that the land with a sure water supply would yield a large return on a value of \$50 or even \$100 per acre it was recognized that larger investments in construction would be justified. Year by year the limits of assumed feasibility have been increased, so that by 1905 it was assumed that \$30 per acre was large, then \$40 per acre, and finally, in 1910, a cost of reclamation of \$60 per acre was not considered prohibitory for lands, especially in the southern part of the country. In fact, when consideration is had of the great value of orchard lands, an expenditure of \$100 or more per acre to provide water is feasible. In semi-tropical lands, for example, in the Hawaiian Islands, where pumping plants have been erected for raising water for irrigation to a height of 550 feet, an outlay of several hundred dollars per acre is not considered out of the ordinary.

In the northern temperate regions, for example, in Colorado and Montana, for the ordinary field crops an investment of \$40 to \$60 per acre may be now considered as large but not prohibitory. This may be increased notably for warmer regions with longer crop season, such as those of southern Idaho and portions of Oregon and Washington. Going south from here to points, as in Arizona and California, where crops grow throughout the greater part of the year, an increase of 50 per cent in the amount above named may be considered as moderate.

If estimates are based on the crop production of thoroughly irrigated lands, it can readily be seen that these give a good income on an investment of from \$200 to \$500 per acre, so that theoretically the figures above given could be increased several fold, but as a matter of fact, under existing conditions, it is hardly safe to figure on this basis, although it is possible to look forward to a time when far larger investments than now considered wise will be the rule rather than the exception. (Principles of Irrigation Engineering, Newell & Murphy, p. 232.)

² The immediate or present value of the crops produced in an area should not be used as the limiting feature, because it is proper to assume that with more complete development of the area there will result larger crop production and better facilities for marketing and hauling this. It is also safe to assume that as the country is developed there can be no overproduction in the sense that such large quantities of crops will be produced that the value will decrease. This condition may exist temporarily, but with irrigated lands forming such a small percentage of the arid West this condition can not be permanent; hence it is desirable to use a reasonable optimism with regard to future crop values, basing these not upon the temporary conditions of extremely high or low values but upon those which may be considered more nearly normal. (Ibid.)

in the San Carlos project must earn not only the annual charge of \$6.24, the livelihood of the owner and family, and the cost of improvements and depreciation thereof, but interest on the enhanced value of the land caused by the adoption of the project.¹

212. As regards the Indian lands, it is not so certain that the project is a desirable one. In weighing the desirability of incurring the large expenditures necessary for providing for the Indians by means of this project, there must be taken into consideration the character of the Indian as an agriculturist. In his present condition he is not so efficient an agriculturist as the white farmer; many of the Indians are not provided with the necessary seed, farm implements, and stock required to begin the efficient cultivation of the acreage which is proposed to allot; some of the Indians, having been cared for in a measure by the Government for a number of years, have lost the ability to be self-sustaining, and some time must elapse before there can be developed in them the desire to become self-supporting. In the beginning the Indians can not be expected to efficiently cultivate the entire 40,000 acres proposed to be included in the project, nor in fact to cultivate any considerably greater acreage than that which will afford them a bare subsistence, and yet the failure to efficiently cultivate the entire acreage for which stored water is provided means that the lands will not be earning an income on the investment and that some of the stored water is not being put to beneficial use.

213. For a number of years the United States will have to continue its paternal guardianship of the Indians, and for many of the Indians there must be provided seed, implements, and stock. This latter expense, which the board has made no attempt to estimate, is in addition to the cost of the project. This, however, can be returned to the Government by leasing to white farmers such portion of the Indians' 40,000 acres as they are at present unable to efficiently cultivate. It is believed that such a proceeding would be mere business prudence. It might even be found to be advisable for the Indian Bureau to undertake the cultivation of a certain area, employing the Indians as farm laborers until they have acquired the ability and the means for cultivating temporary allotments afterwards to be assigned to them. Finally, after a number of years of fostering care, permanent allotments may be made. At the present time, to make permanent allotments of 10 acres of irrigated land to each man, woman, and child would result in a large part of the land lying idle and in another part being poorly farmed.

214. In suggesting the lease of the unused portion of the 40,000 acres, the board does not expect that the returns therefrom will be applied to offset the construction costs of the project;² but rather that

¹ At the time the reclamation act was passed the reclaimable lands could be had at a nominal value—a little more than the cost of keeping the title and procuring the conveyance, or upward of \$5 an acre. Within the 10 years subsequent to that time these lands have not been improved in any way, except by the building of the works by which water might be obtained, but the asking price has jumped from \$50 to \$100 or more per acre. In some cases the prices asked for the raw land have increased a thousand per cent. It is this unearned increment which is really the great load which is holding back the rapid development of irrigated lands in the West, whether watered by the use of public or private capital. It has stimulated the work in one way, and at the same time has developed a class of men who are largely interested in getting a piece of land in the hope of selling a relinquishment of title. They have found that the profits from simply holding the irrigated lands out of the market are greater than those from utilizing these lands in the production of crops; the second or third comer, who may be the real farmer, thus has to incur not only the cost of clearing, leveling, and subduing the soil, adding improvements, and paying for the water supply, but in addition has the burden, equaling or exceeding the other costs, of paying for the unearned increment charged for the land. (Eleventh Annual Report of Reclamation Service, p. 8.)

² Not to require the Indian allottees to reimburse the United States for the cost of their share of the project is not incompatible with such a tenure of the land as is prescribed for the Santan lands in section 3 of the Indian appropriation act of Aug. 24, 1912.

they be applied to the cost of operating the system and to reimbursing the United States for the outlay necessary to provide the Indians with implements, live stock, etc.; nor does the board contemplate that such an arrangement shall continue beyond the time when the Indians are competent to conduct their farming operations in the intensive manner required to produce a return on the original investment.

215. From the above remarks, it appears that a project which is financially advisable for white agriculturists may not be so for Indians. It is true that the Indian will improve; but as the evolution of the race will be a slow process, it will be necessary for the United States to continue the close supervision until the ability of the Indian as a farmer is sufficiently well established to warrant the making of permanent allotments of the irrigated land. In the meantime, as above outlined, the surplus irrigated land over that well cultivated by the Indians should be leased to white farmers or otherwise farmed under the direction of the Indian Bureau. Only under this or some other plan whereby beneficial use may be made of all the water is the board convinced of the desirability of the San Carlos project for the benefit of the Indians.

216. The irrigation facilities provided under this project will excel any ever before enjoyed by the Indians, and to that extent the project might seem a gratuity to the Indians. But in dealing with this question it is not more important to right the wrong of the past than to provide for the future advancement of this tribe. There is no other way to effect a satisfactory and permanent solution of the long-standing Pima question.

RECOMMENDATIONS.

217. The board recommends—

(a) That the San Carlos irrigation project, as described in this report, be adopted and carried out by the United States, provided it shall appear, either as the result of an adjudication or of competent legal opinion, as Congress may elect, that the legally available water supply is sufficiently close to that assumed in this report to make the cost of the project not more than \$75 per acre.

(b) That suit for an adjudication of water rights along the Gila River be immediately brought in the United States district court (the United States being a party to the suit) and that every other step be taken which will hasten an early adjudication.

(c) That such executive and legal steps be taken as may be necessary to prevent the vesting of any water rights in addition to those, if any, now existing.

(d) That in case the project is not undertaken until after an adjudication, a diversion dam on the reservation (par. 171) be constructed to improve irrigation conditions on the Pima Reservation.

W. C. LANGFITT,

*Colonel, Corps of Engineers, United States Army,
Senior Member.*

C. H. MCKINSTY,

*Lieutenant Colonel, Corps of Engineers, United States Army,
Member and Executive Officer.*

H. BURGESS,

*Major, Corps of Engineers, United States Army,
Member.*

APPENDIX A.

REPORTS, ETC., CONSULTED.

1. In addition to the reports, etc., mentioned in the board's report, the following were consulted:

- Water-Supply and Irrigation Papers, United States Geological Survey, especially Water-Supply Paper No. 33.
- Annual Reports of United States Geological Survey (certain).
- Annual Reports of United States Reclamation Service.
- Reports of various hearings before the Committee on Indian Affairs, United States Senate.
- Reports of various hearings before the Committee on Indian Affairs, and other committees, United States House of Representatives.
- Conserving the Rights of the Pima Indians, Arizona. House Document 521, Sixty-second Congress second session.
- Specifications of United States Reclamation Service for the construction of certain dams.
- Arid Lands. Various articles in Transactions American Society of Civil Engineers, and other engineering publications.
- Resources of Pinal County, Ariz. Prepared for the Special Senate Committee on Arid Lands.
- Pinal County's Chain of Great Wealth-Producing Resources. Special illustrated edition of the Arizona Blade-Tribune, 1903.
- Decision in the Supreme Court of the Territory of Arizona, Montezuma Canal Co. v Smithville Canal Co. et al.
- Decision and Decree in the District Court, Maricopa County, Ariz., Patrick T. Hurley v. Charles F. Abbott et al.
- Irrigation Investigations in California. Senate Document No. 356, Fifty-seventh Congress, first session.
- Underground Waters of Salt River Valley, W. T. Lee, Water-Supply and Irrigation Paper No. 136, United States Geological Survey.
- Bulletin No. 31. Iowa State College of Agriculture. 1913.
- Bulletin No. 41. Irrigation at the Station Farm. 1898-1901.
- Bulletin No. 48. Relation of Weather to Crops. 1904.
- Bulletin No. 53. Irrigating Sediments and their Effects upon Crops.
- Bulletin No. 63. Irrigation and Agricultural Practice in Arizona.
- Twenty-third Annual Report, University of Arizona, Agricultural Experiment Station.
- Principles of Water Analysis. Bulletin No. 34.
- Composition of Some New Mexico Waters. Bulletin No. 83. New Mexico College of Agriculture and Mechanic Arts. Agricultural Experiment Station.
- Report in the matter of the investigation of the Salt and Gila Rivers, Reservations and Reclamation Service. House Calendar No. 390. Sixty-second Congress, third session.
- Irrigation in Imperial Valley, Cal. Senate Document No. 246, Sixtieth Congress, first session.
- Irrigation in Arizona, by R. H. Forbes. Bulletin 235. United States Department of Agriculture, Office of Experiment Station.
- Irrigation near Phoenix, Ariz. Arthur P. Davis. 1897. Water-Supply Paper No. 2, United States Geological Survey.
- Water Storage on Salt River, Ariz. Arthur P. Davis. 1902. Water-Supply and Irrigation Paper, No. 73. United States Geological Survey.
- The Underground Waters of Gila Valley, Ariz. W. T. Lee. 1904. Water-Supply and Irrigation Paper No. 104. United States Geological Survey.
- Irrigation Conditions, San Carlos Indian Reservation. Report by J. W. Martin, Superintendent of Irrigation. 1909.

NOTE.—Certain unpublished reports and letters not listed above were consulted.

APPENDIX B.

BOX CANYON AND DAM SITES.

1. At the west end of the San Carlos Valley, constituting the reservoir site, an upheaval has occurred, faulting obliquely across the river's course a half mile above the dam site and exposing the rock stratification to heights of a thousand feet for long distances to either side of the river. Through the first ridge the first installment of the box canyon extends in a southerly direction, exposing again the stratification on either side, showing their dip to be downstream and a little to the right. The rock at the beginning of the canyon is therefore oldest, being that which before the upheaval was lowest. It is a red granitic rock badly crushed.

2. Continuing down river, the next rock exposed, formerly overlying the granitic rock, is a hard shale dipping about 45° downstream. This shale has been compressed and baked to a degree that it will not disintegrate much, if at all, on exposure. Next comes a small amount of argillaceous sandstone, which at this place shows good endurance. Now the river turns to the left and the rock on both sides is quartzitic sandstone shading into quartzite, which steepens the walls and narrows the canyon, making the first gorge, which is at line marked "K" on the survey plat. This gorge is shown in photographs, plates 2, 3, and 6. Between line K and line G, 300 feet upstream, is the general location selected by the board to be explored in 1913 for a dam site. In this vicinity the dip of the strata is downstream and a little to the right, and its amount lessens progressively from about 45° next the shale upstream to about 30° at the gorge. Following up the canyon side on, say, line H, the rock continues quartzitic to a height of about 180 feet on the right side and higher on the other, above which the character changes to calcareous sandstone; thence lime shale, which has disintegrated more, making the slope flatter and covering it with débris; thence, at elevation of about 300 feet, limestone, more massive and of better quality, forming a nearly vertical wall of considerable height.

3. Above the gorge, on the left side, some distance above line G, a fault is visible. Where exposed near "a" there is absence of loose broken rock, and the joint is very narrow and completely and tightly filled with indurated material. Pits sunk through talus at lower elevations at points marked "b," "c," and "d" reveal the same satisfactory condition. This fault is not in evidence on the opposite side of the canyon, unless it be by a slight contortion of strata seen at a high level. It therefore would not be to any degree a menace to the reservoir, nor to a dam built in the location proposed.

4. Downstream from the gorge about 100 feet below line K is another fault crossing the canyon obliquely, as marked on the plat, which, on the right slope, indicates a relative displacement there of

more than 100 feet, the downstream side having gone down (or the other up). Photograph plate 10 shows this fault in the west wall. Pits through talus at "e" and "f" show sound rock extending to a narrow tightly filled joint. Pit at "g," though carried to bedrock, did not find the fault. The inclination of this fault on the right bank is such that the upstream side is supporting the other, making the upstream side be the more certainly stable to build upon. On account of this fault the two holes were drilled on line M 100 feet below the field at first intended to be explored, principally to determine whether there is a jump-off there to some lower elevation found for bedrock about 700 feet downstream in 1903. The westerly hole is below the fault in altered quartzite, reddened doubtless by heat at time of faulting. The easterly hole penetrated the reddish breccia—small fragmental rock in a matrix of indurated clay—which doubtless fills the fault joint. On the left bank the displacement on the continuation of the fault is less pronounced. The joint branches, as shown on the plat, into two parts, one continuing in the former direction and the other directed more to the right, or downstream. The one shows only as a fracture without accompanying displacement; the other indicates displacement in which the downstream side has gone relatively down. Both are tight joints, as close as the bedding between strata. This fault is of little importance in connection with the proposed dam so far removed; for strata outcropping under the river above the heel of the dam as located would not, on account of their dip, intersect the fault short of 200 feet below the surface. Though the bedrock at the westerly hole on line M is quartzitic, the dip of the strata, together with the displacement at the fault, renders only calcareous rock visible in the side walls below; and because of its inferior endurance, the valley is a little wider, with slopes less steep, until the better, massive limestone capping has descended on both sides of the canyon to river level, making a second narrow gorge with steep walls at line B on the plat, about 850 feet below line K, at the upper or quartzite gorge. This lower gorge is shown on photographic plates 4 and 6.

5. At line C, 73 feet below line B, another pronounced fault crosses the canyon obliquely, intersecting the left side below line C and the right side above. At this fault the downstream side has gone down with respect to the other, and displacement seems to have occurred at two different times with long intervals between. The first made joint is seen on the right bank to be well filled with reddish breccia, now good rock, and certain holes drilled on line C in 1903 encountered the same material. But along the upstream side of this breccia is an apparently more recent parting, containing broken rock, and extending northwesterly about parallel to the exposed face of the ledge forming the right side of the canyon. And in the top and in the exposed face of this ledge, between lines A and X, is a fracture extending into the talus at the foot, whose width indicates that it must extend back to the fault or fracture behind and that the latter can not be a tight joint. Thus, the right wall at the gorge, so inviting as an abutment for a dam, is a vertical detached slab, with prospect of broken rock and breccia as its backing. Nevertheless, such condition is not necessarily prohibitive to building a dam in this locality. It only adds to its inferiority as compared with the upper site, whose abutments are sounder. Ob-

lique or horizontal drilling through the slab might prove the backing fair; and the judgment might be that, with grouting the fracture and building the dam with its westerly end far enough upstream to overlap the joint, excessive leakage would not occur. With a dam big enough to stand alone, only leakage—not disaster—would be feared. Photograph plate 11 shows this fault in the right bank abutment between lines B and C, and the fracture between A and X is seen in photograph plate 4.

6. Some 300 feet below the fault the limestone ledges forming the abutments at the gorge run into the ground and the canyon widens into a little valley. And within this distance are thermal springs on either side near river level, the one on the right flowing about half a cubic foot per second. Such springs in connection with limestone, which is slowly soluble in such water, make cavernous structure a possibility in that vicinity.

7. In advance of investigations the casual observer's first choice for a dam site would naturally be at the lower gorge, for the canyon is narrower, and the adjacent rock would be expected to quarry more easily for use in construction; and with dam at or below the gorge the topography is favorable for a spillway on the right to discharge its waters into a depression beyond, thence to flow into the river at a considerable distance below the dam.

8. The first drilling was done by the United States Geological Survey in 1899, when two holes were sunk on or near line E, finding bed-rock at a depth of 74 feet; and there a dam was proposed to be located to be entirely below the fault, as described in Water-Supply Paper No. 33. The lower abutment on the right was not unsuitable for the spillway at the height of only 130 feet, as then proposed.

9. The next drilling was in 1903 by the United States Reclamation Service, who completed line E and drilled lines D, C, and B and the easterly end of line A, where, through loss of plant in flood, the work was, for want of time, discontinued. That drilling showed again bed-rock at E to be down 74 feet; also that it rose upstream to but little over 40 feet at line A.

10. The location of drilling in 1903 is suggestive of a dam to be upon the fault. Though a dam on a fault might endure indefinitely, it would be safer to build entirely either above or below, for future displacements, if any, are more likely to be concentrated at existing faults and fractures than to make new ones between. As to whether to locate entirely above or entirely below a fault, there is room for differences of opinion. A fault just above a dam would facilitate entry of water between the strata of the foundation, while a fault below would enable waters otherwise confined to make escape, thus lessening their upthrust; and it is well known that the next best thing to preventing advent of water under a dam is to facilitate its release. But in connection with a fault there are still other considerations, as to which side has the better support and which side has the better rock.

11. The next drilling was by the present board in 1913, when 35 holes were drilled on lines G, H, I, J, K, and M, thoroughly exploring the upper site, with results as recorded in the log of that work. Having time to spare on completion of the above work and with plant and men on the ground, making the cost small, it was decided to complete line A at the lower site where work was interrupted in 1903, and to

drill line X, 100 feet above it, since a dam to clear the fault would extend that far upstream, all of which was done, with results as given elsewhere in the log. The maximum depth to bedrock drilled on line A is 42 feet, and on line X 34 feet.

12. The drilling, as above, at the lower site was not done on account of any remaining doubt as to the superiority of the upper site after finding bedrock there at so high a level (about 20 feet) and of satisfactory character, but to reduce the unknown quantities, to the end that the relative advantages and disadvantages of the two sites may be more definitely known to all, even to future reviewers, if any, who might choose to weigh them differently.

13. A few things not fully revealed in the logs of the drilling may be here recorded. The work was at all times under the immediate direction of Mr. W. E. Jones, whose natural aptitude and extensive experience add special value to the work. Though floods were many, requiring frequent removal of plant, not a hole was begun that was not fully completed, leaving not a doubt behind.

14. In general description of the foundation at the upper site it may be said that the bottom is a continuation of the strata exposed on either side. Though the joints between strata above ground are through long exposure somewhat open next the surface not a void was found in drilling, the rock being everywhere next to rock without softer material between. Owing to the pressure resulting in the upheaval the rock has incipient seams in various directions along which partings so readily occur that much of the core obtained is fragmental, and its aggregate length is far short of the depth of drilling. With oblique fracture the resulting wedge-shaped pieces of core, driven down by their own weight and the force of the down-rushing water, would become jammed in the core barrel and grind themselves and the standing core beneath. The softest stone found at the upper site is in the westerly hole of line G. Its hardness is about that of a grindstone. Because in this hole the drilling was fastest and the core was least in amount, indicating much fracturing as well as softness, it was selected for a pressure test.

15. The lower 10 feet of it was subjected to water pressure repeatedly raised to 100 pounds per square inch, which was the limit of the pump, and afterwards with continuous very slow pumping and with pressure fluctuating between 80 and 100 pounds it was found to take water at the rate of 3 gallons per hour. Considering that the water under pressure was but 10 feet below the surface of the rock and only 20 along a stratum to its outcropping upstream, and in comparison with similar experiments that have been made at other dam sites, the result is very satisfactory in indicating that though a degree of up-thrust may occur to the dam the amount of leakage traversing the long distance under its base will be very small.

16. No compressive strength tests have been made of the core material, for that would be idle in determining its bearing power against the weight of a dam. Sand, unless artificially bound, would make no showing in a testing machine, yet it would support a dam if not carried away by water. Besides, it is sufficient to know that hills on either side several times as high as the proposed dam are supported by the same rock.

17. As to dip of strata there is no choice between the different sites. The downstream dip is objectionable only in that it creates greater

likelihood of water entering between strata under the dam with resulting upthrust. But to counteract such upthrust with the same certainty that the horizontal pressure of reservoir water is opposed only requires more yards of masonry to give greater weight to the dam.

18. It may be here remarked that chance of water pressure under a dam is not absent in case of horizontal strata or even upstream dip, for generally in these mountains the strata themselves are so broken as to make leakage through them possible. It is reasonably certain, too, that to make strata with downstream dip as proof against leakage as any other foundation of similar rock only requires an impervious blanket of asphaltum or concrete on the bedrock next the dam on the upstream side. But for possible breaks through strata, such blanket covering their outcropping could be relied upon to conduct and confine leakage, if any, to so deep a level that the overlying natural rock would alone offset its upward hydrostatic pressure.

19. However, considering the more or less broken character of the rock generally, and the disaster that would follow failure, an offset against possible upthrust should be provided regardless of presence or direction of dip.

20. A downstream dip would be even advantageous in case there should be weak compressible strata between stronger ones, for then the stronger strata would lie more nearly in the direction of the resultant force to be borne when the reservoir is full, and by their excess strength would shield the weaker strata from the compression to which they would be subjected were the force normal to their planes, and thus lessen the slight yielding which occurs on filling the reservoir.

21. At the lower site a much softer material is found in a stratum into which the casing under the weight of itself and three men could be worked down following the churn drill chopping a smaller hole inside. It is not considered that this limited amount of soft material, though it doubtless continues in a stratum to the fault downstream, would be a real menace to a dam constructed over it, for it is not of the character that under pressure will slowly flow like asphaltum and some wet clays; besides it would have only the lighter portions of the dam to support. But it is a finding which makes this foundation inferior to anything found at the upper site. That soft material at the lower site is found at but few feet below the water at the end holes on line X, also in the westerly hole on line A, but at a greater depth; and it is said that in 1903 it was found in the easterly hole of line A. This soft stratum is indicated in cross-sections A-A and B-B opposite page 90 of Second Annual Report of the United States Reclamation Service.

22. No drill hole has given indication of a fracture lengthwise of the canyon, though one probably occurred at perhaps a higher level. Any fracture is limited to the depth at which plasticity, due to heat, enables the rock to yield without cracking further, nor need the plasticity be great to provide the necessary yielding if the upheaval be slow. Considering the above, if such fracture ever existed at high elevations, there is less likelihood of its having reached present river level at the upper site than the lower, for the upper site was at the time of the upheaval, further underground by the amount of the present dip of strata between the two, together with the dis-

placement at the intermediate fault—about 500 feet in all. The probability of such degree of plasticity having existed at the upper site is evidenced by the metamorphism which has obliterated some of the stratification, and has changed siliceous sandstone to quartzite; and by the contorted flow lines visible to a considerable height in the left abutment, which has been elevated a little more than the right one.

23. But were such fracture to be found at either site, that alone would not condemn the foundation—only make it fall a little shorter of the theoretical best, which rarely exists.

24. Moving the lower dam site upstream to avoid the fault so increases its length and the amount of masonry required, as to greatly reduce its principal item of advantage over the upper site; and even after such moving its toe would be close to the fault, while the toe at the upper site would have the nearest fault some 200 feet away.

25. In conclusion, the writer would not condemn the lower site above the fault, were there nothing better; but as the result of all investigations to date, would unhesitatingly choose the upper site instead, considering it satisfactory in every respect.

NEEDLES EYE.

26. An inspection was made of the possible dam site at the gorge locally known as the Needles Eye, on the Gila River about 7 miles below the San Carlos dam site. There the canyon is, as its name implies, very narrow. The rock is quartzitic, of good quality, with strata dipping downstream. The wall on the left bank rises nearly vertically to a height of about 400 feet, and is apparently sound; while that on the right, though attaining a height more than sufficient for any dam that would be contemplated, recedes in a series of benches and is fractured to a degree that would make leakage through it a not unlikely accompaniment of a dam if built very high.

27. The Needles Eye is not to be regarded as a competitor of the San Carlos site for an impounding dam; for though the Gila River Canyon between, together with Hawk Canyon which joins it from the east, would afford considerable storage room, the river bed is about 116 feet lower, which would necessitate a much higher dam to provide the same reservoir capacity. Besides, the more distant dam would greatly increase the cost of dredging contemplated for the maintenance of the reservoir. The Needles Eye is also difficult of access. Yet it is to be borne in mind as a suitable site for a dam of moderate height for development of power.

28. Photographic plates 14 to 18 give various views of the Needles Eye. A pronounced feature is the huge boulders fallen from the wall on the left bank and occupying the bed of the gorge for a distance of several hundred feet—some of the boulders being more than a thousand tons in weight.

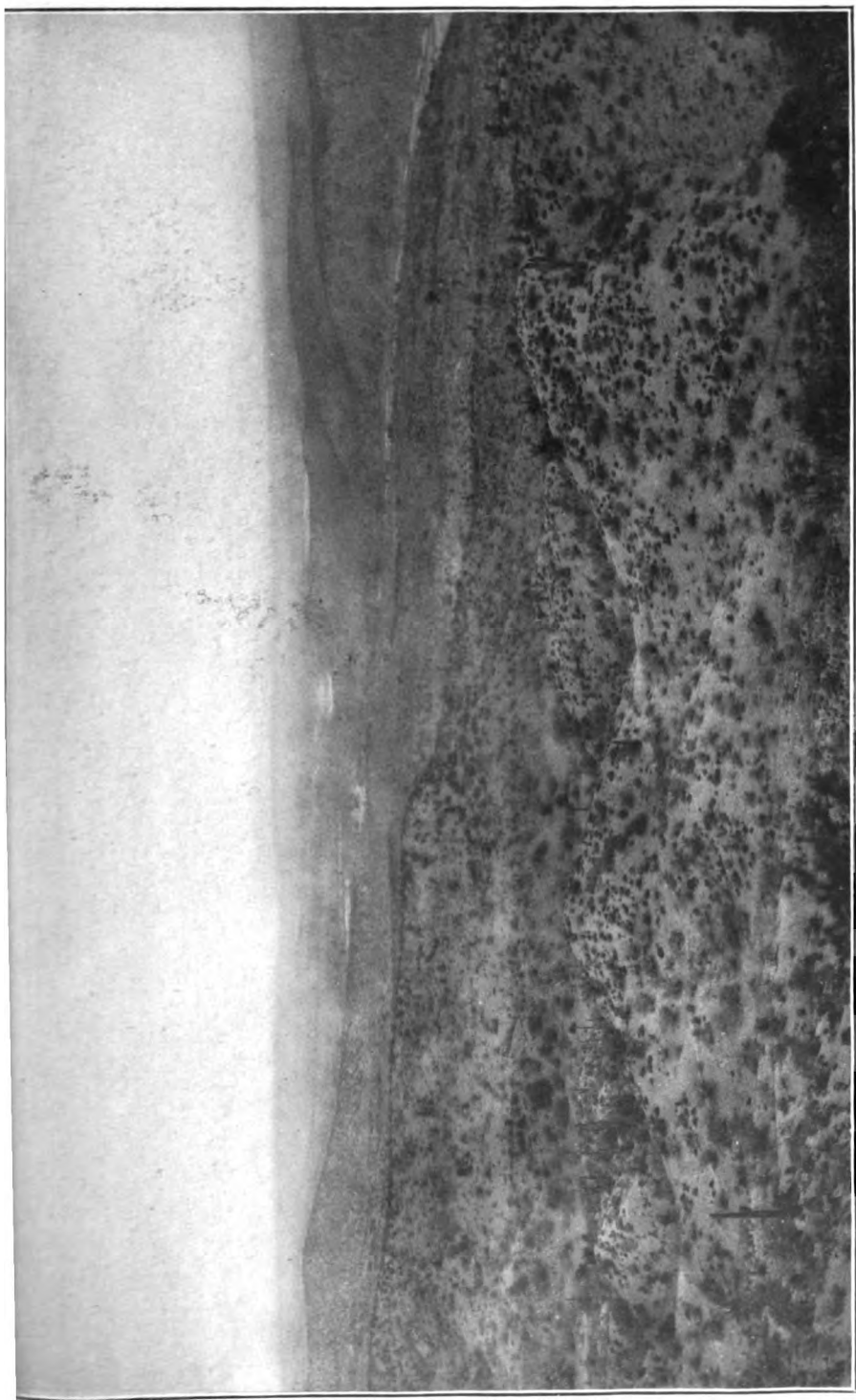
29. It is said that among these boulders water is always present, though the river may be dry above and below. This may be an indication that it is not deep to bedrock, though it is not proof of it in this case, for the gorge can be very deep yet so constricted by narrowness and boulders that water must "rise" to pass. The indications are that prior to the great flood of 1905 the sand and gravel constituting the bed of the canyon were a few feet higher than they are at

present, probably covering the toe of the sloping rock which projects from the foot of the bluff into the gorge, and causing the thought which has been expressed that bedrock, being seen extending under the water, could not be more than a few feet below at the deepest place. But now this sloping rock can be seen to terminate abruptly, as though it were but a bench on the side wall of a deeper gorge.

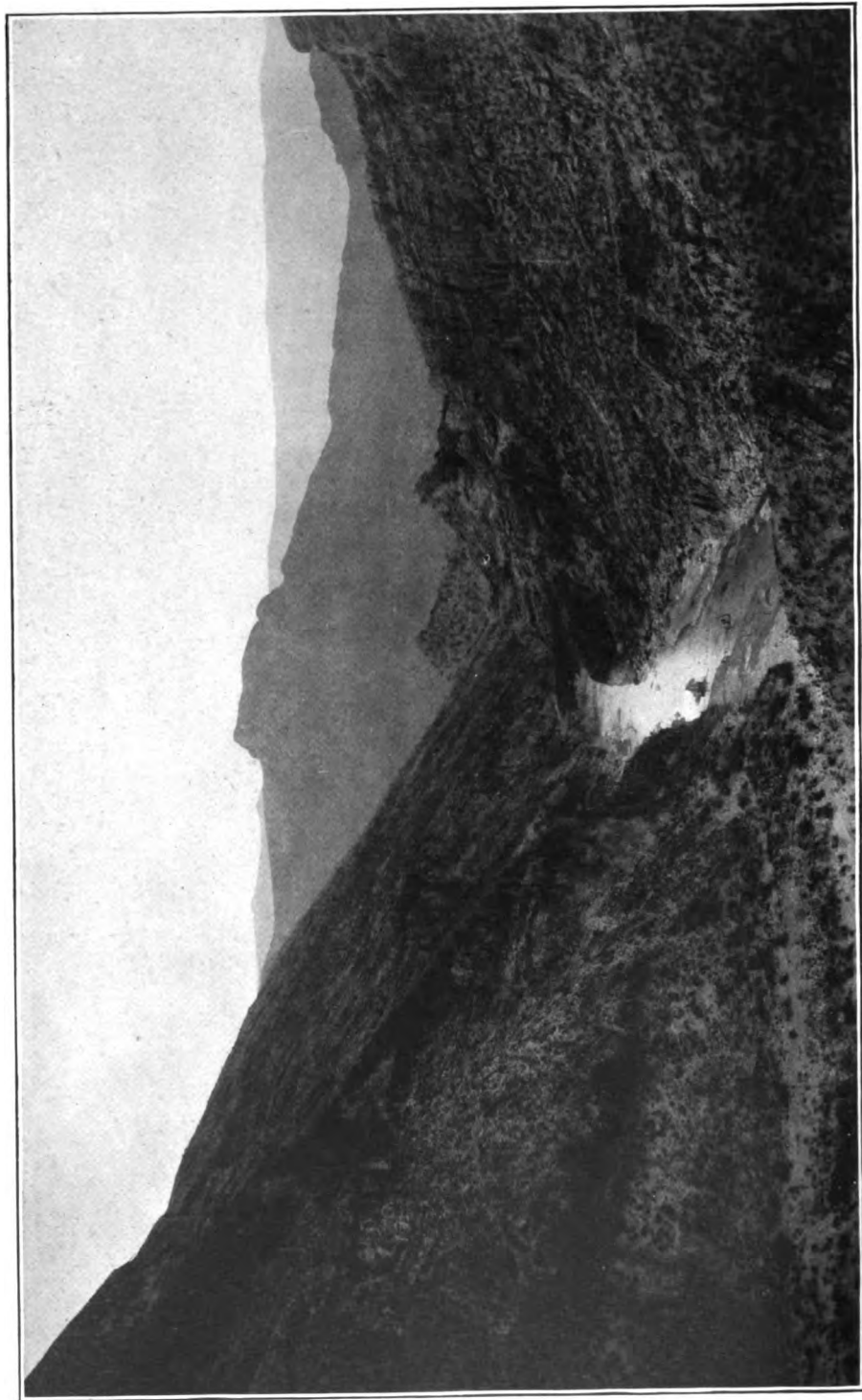
30. But be the bedrock as it may, the site is well adapted to an overfall rock-fill dam of moderate height, which, owing to the high sheer bluff of sound rock, could be cheaply constructed; and considering the limited amount of water that would be impounded by it, whereby not much damage could result in the event of its release, such a dam would be permissible at this place, particularly if a dam shall first be built at the San Carlos site, which would intercept or moderate the floods.

31. Between the Needles Eye and the mouth of Hawk Canyon, some $2\frac{1}{2}$ miles above, is another promising dam site between walls of granite rock. Doubtless other sites exist below suitable for power development. It is to be remembered, however, that there is a limit to height and number of such dams, which should not be passed, for any great reduction in the average grade of the river would unsuit it for conveying silt when desilting operations shall be required.

D. E. HUGHES.



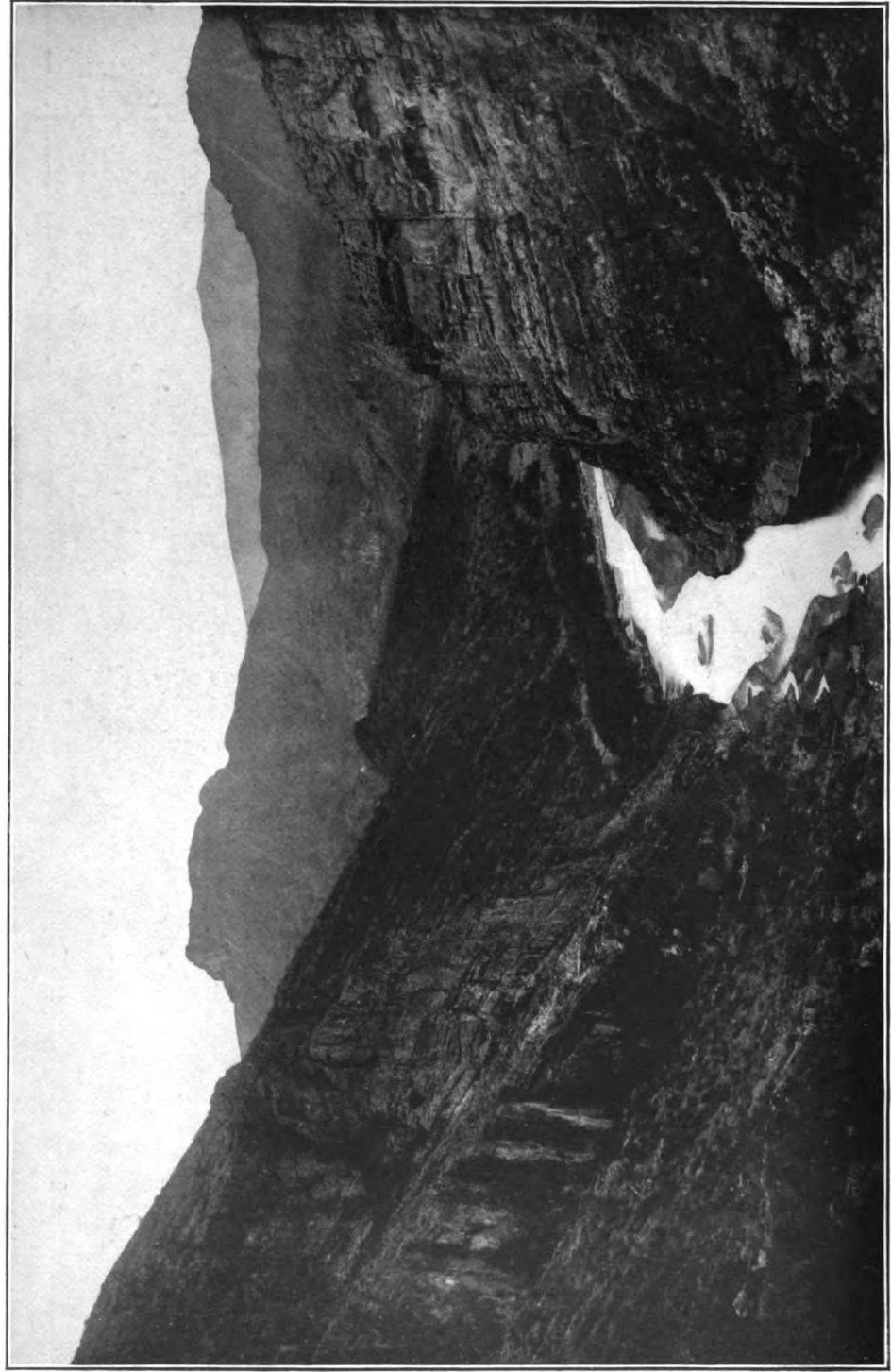
SAN CARLOS RESERVOIR SITE, LOOKING EASTERLY FROM HILLTOP, UPSTREAM FROM DAM SITES.



SAN CARLOS BOX CANYON, LOOKING DOWNSTREAM FROM HILLTOP, UPSTREAM FROM DAM SITES.

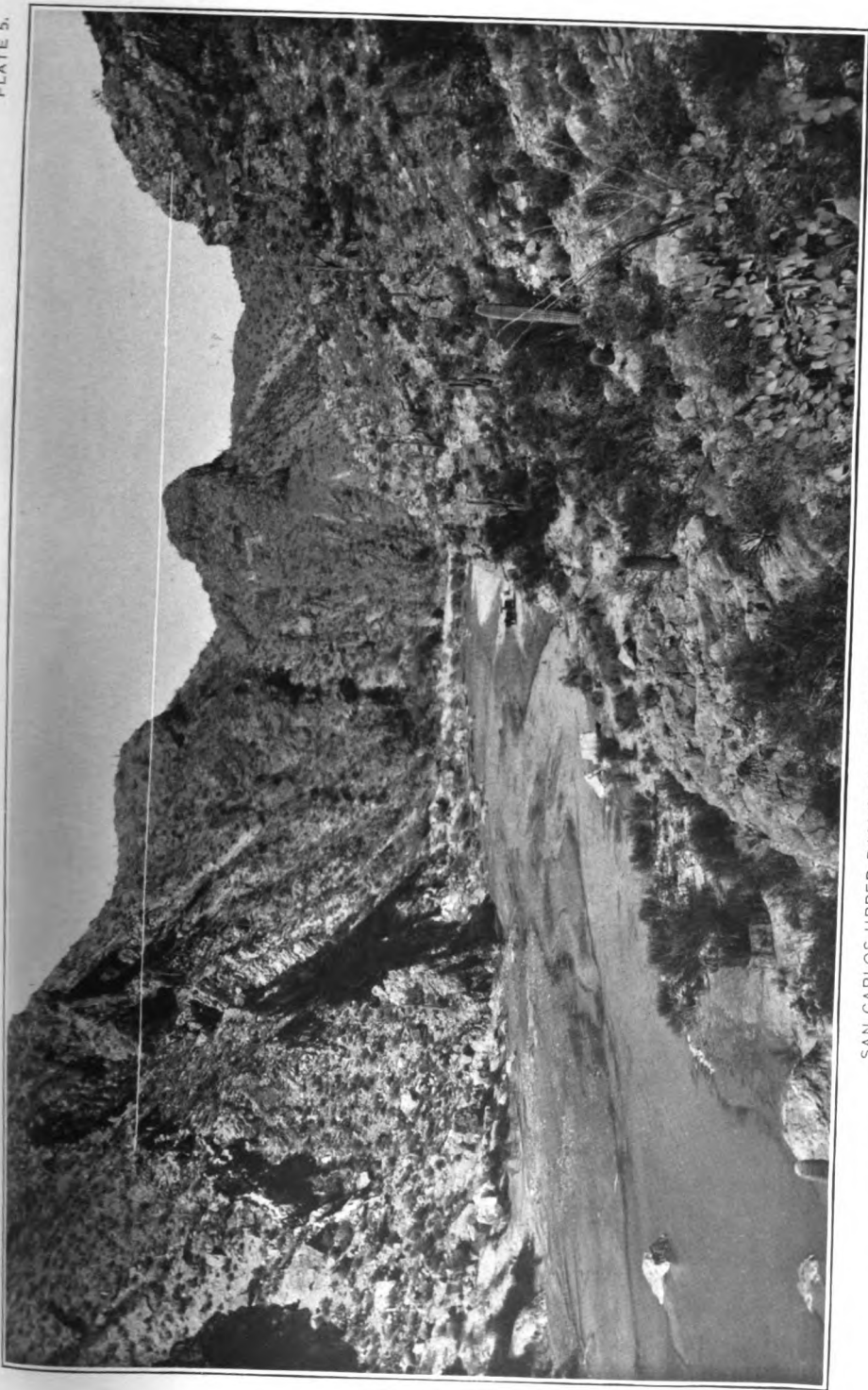


SAN CARLOS DAM SITES, LOOKING DOWNSTREAM.



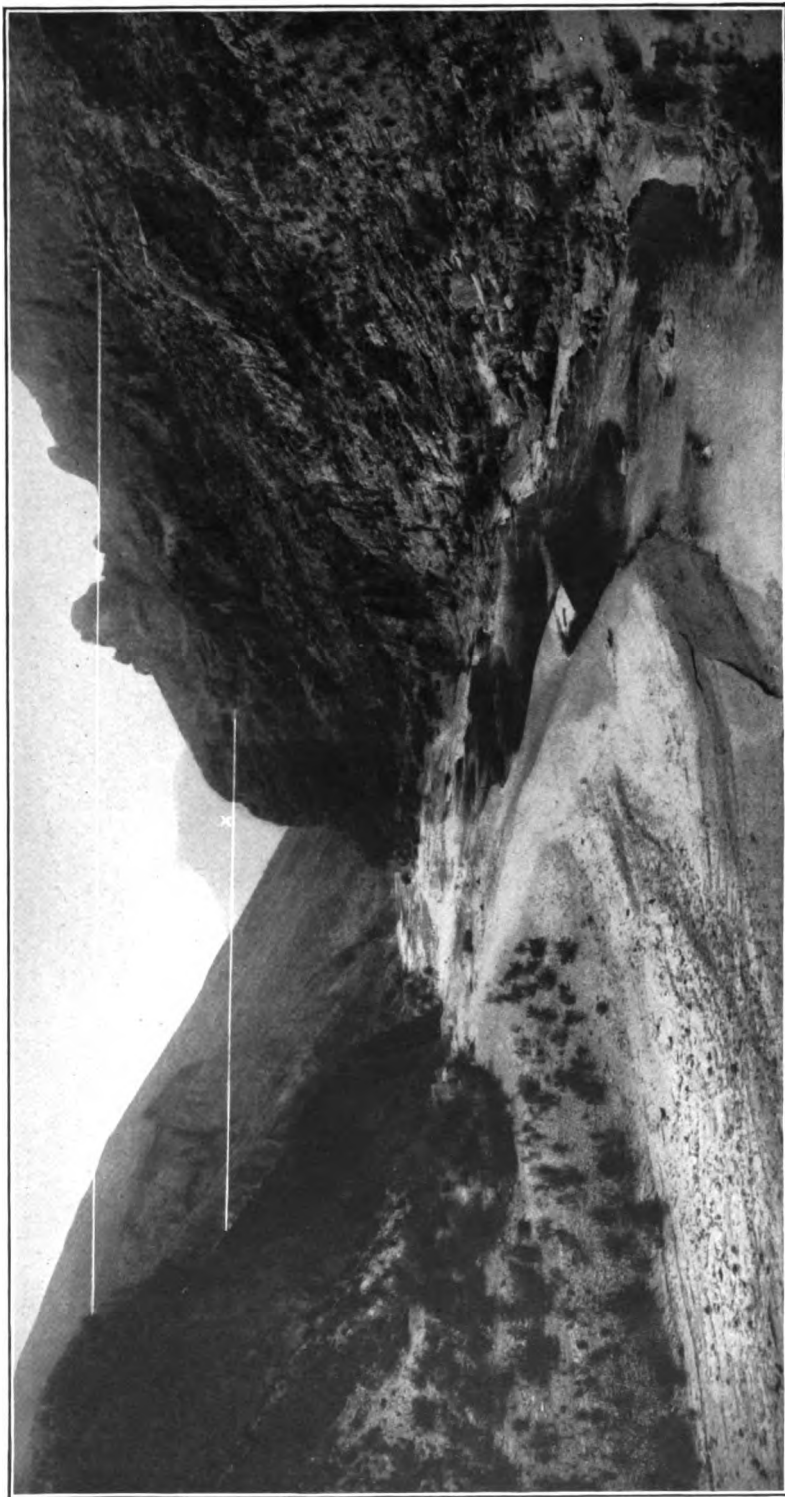
SAN CARLOS LOWER DAM SITE, LOOKING DOWNSTREAM.

the right bank abutment the fracture which probably extends to an intersection with the fault shown in Plate 11.



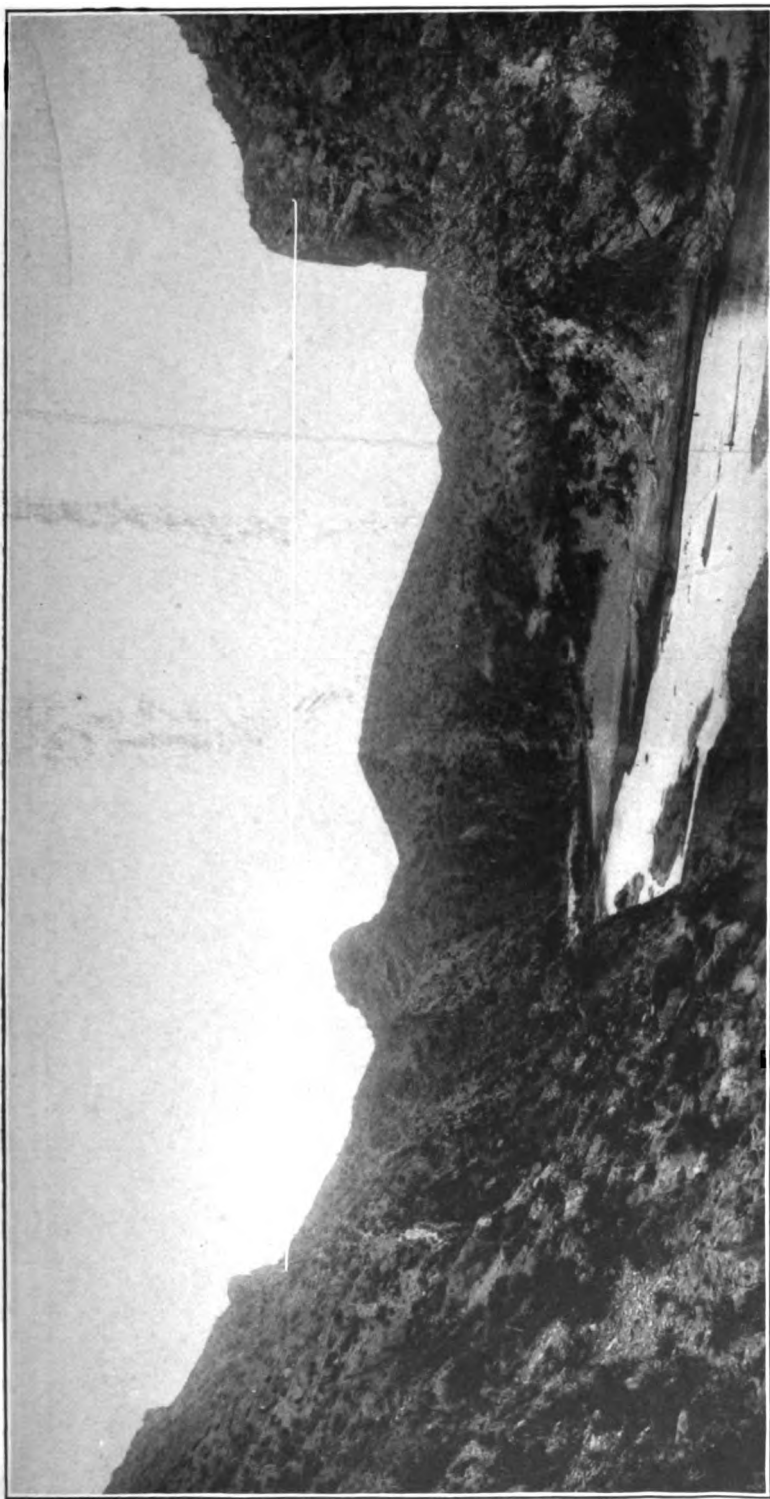
SAN CARLOS UPPER DAM SITE, LOOKING UPSTREAM FROM LEFT BANK.

Showing line H at elevation of 180 feet. This line is the chord of the proposed dam at the elevation of the spillway. (Elevation 180 feet.)



SAN CARLOS DAM SITES, LOOKING DOWNSTREAM.

Showing lines H and X at elevations of 180 feet.

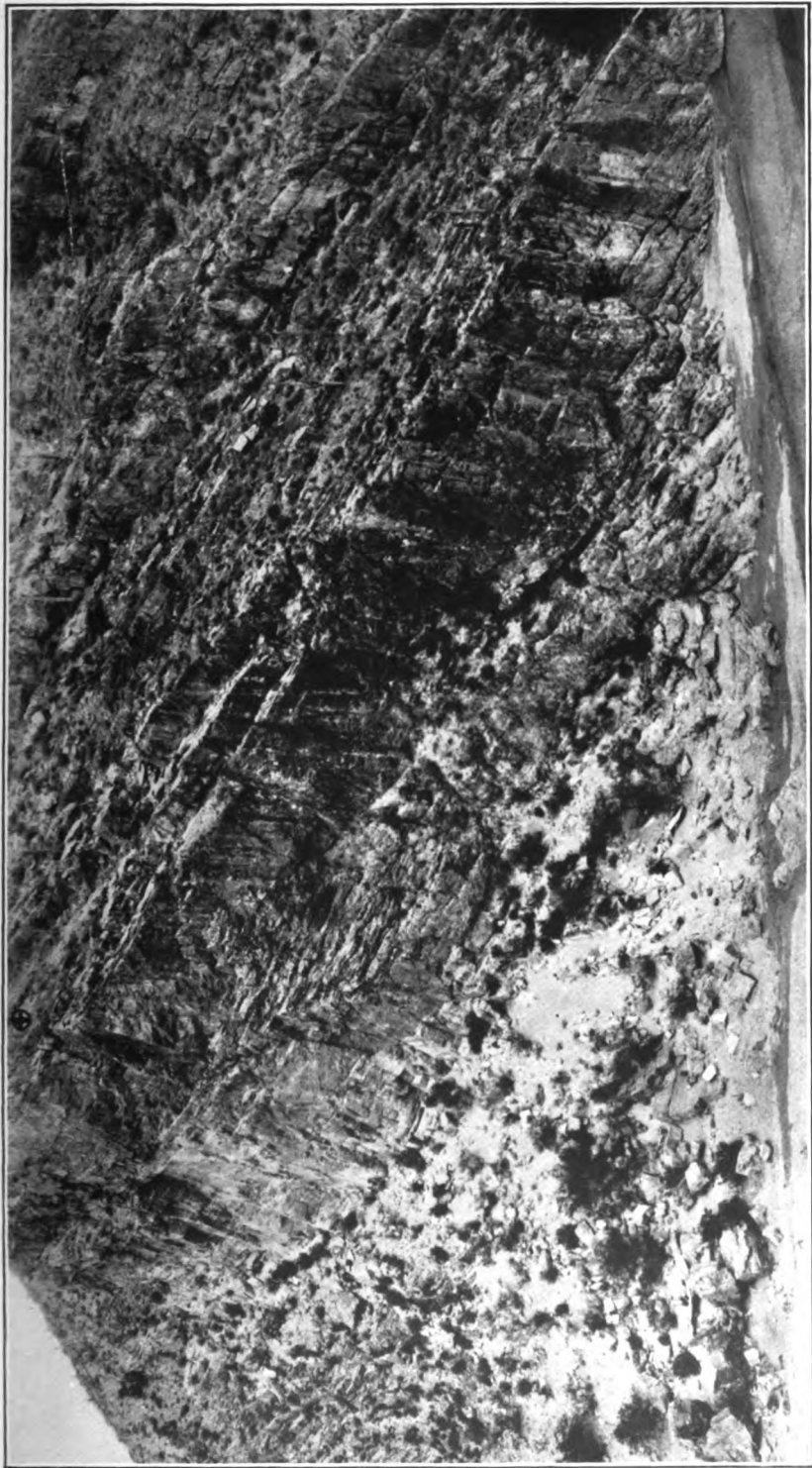


SAN CARLOS UPPER DAM SITE, LOOKING UPSTREAM FROM RIGHT BANK.
Showing line H at elevation of 180 feet.

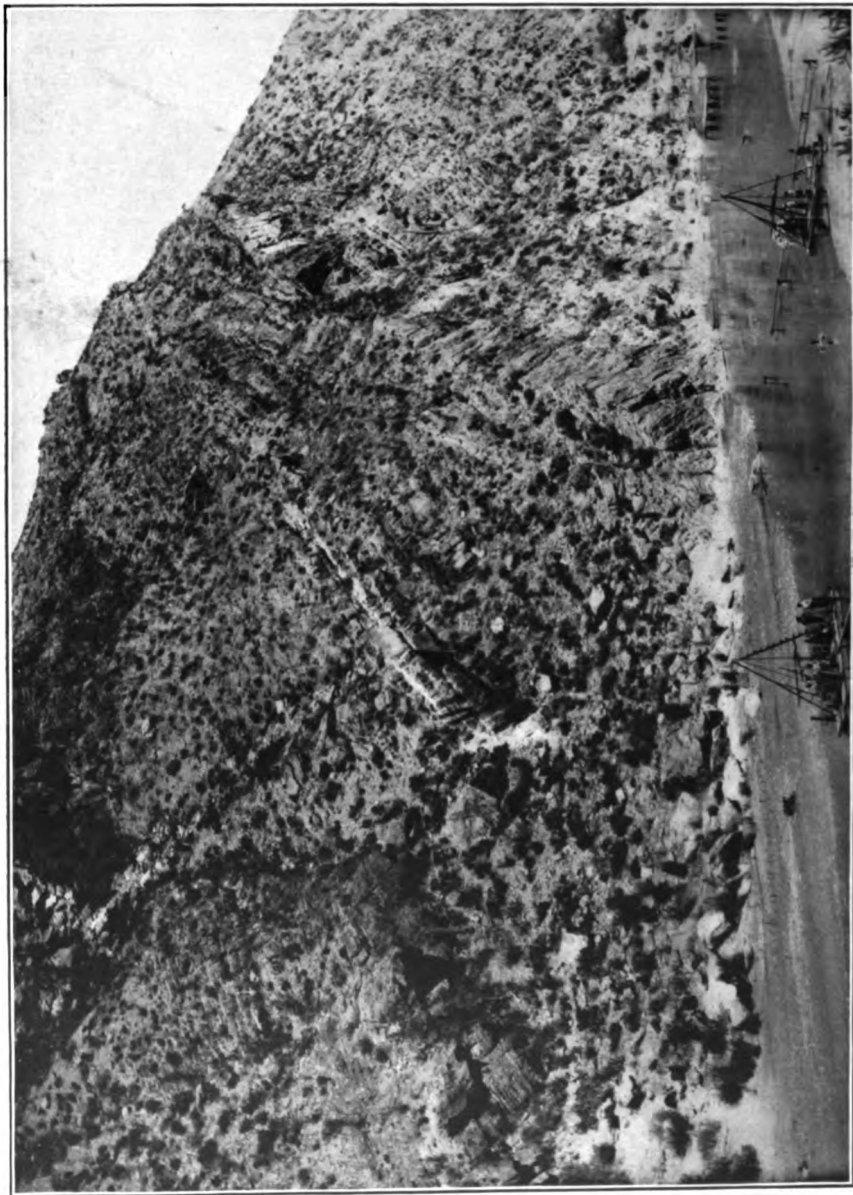


SAN CARLOS UPPER DAM SITE. RIGHT BANK ABUTMENT.

Showing point at elevation of 180 feet on H.



SAN CARLOS UPPER DAM SITE. LEFT BANK ABUTMENT.
Showing point at elevation of 180 feet on line H.



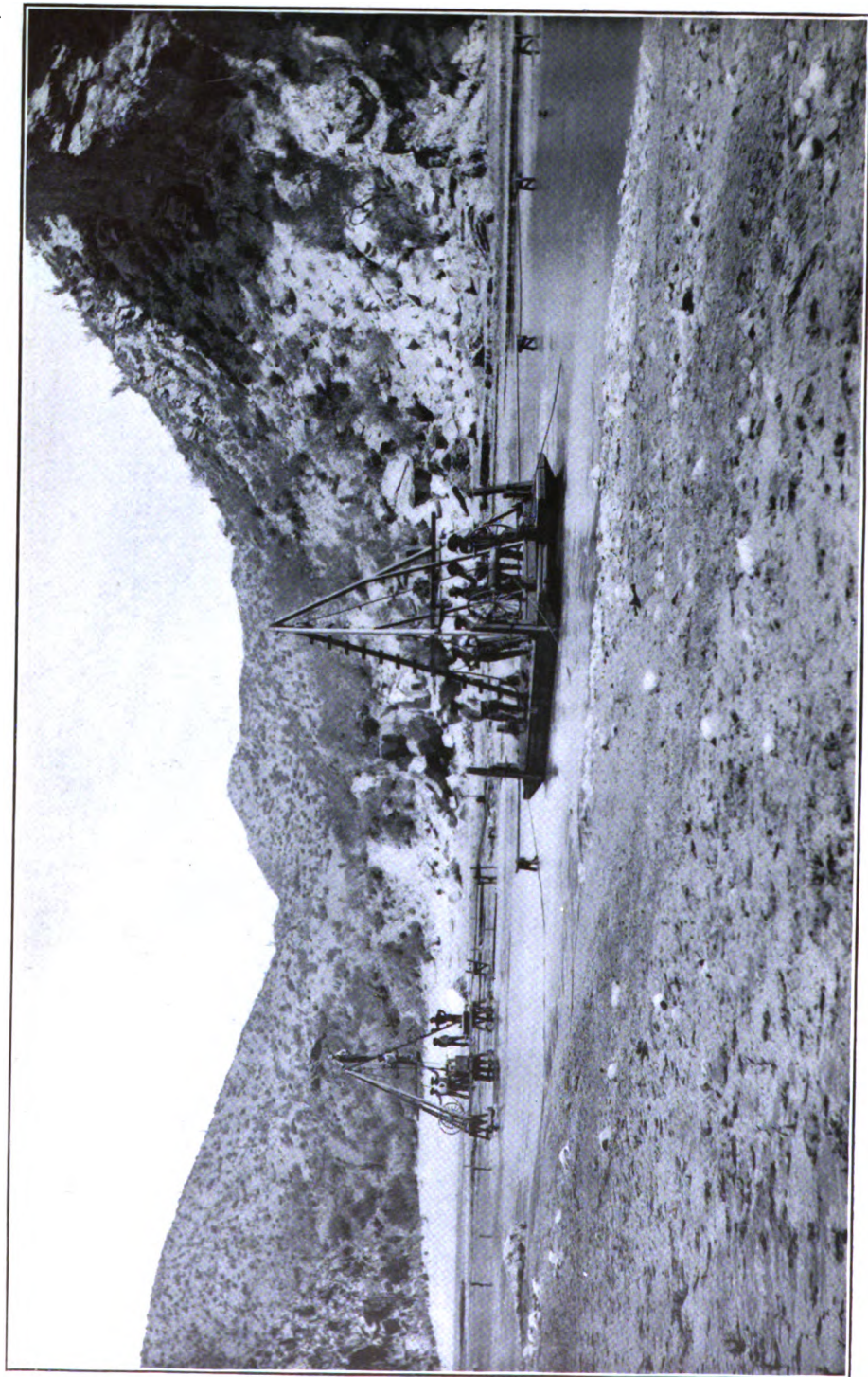
WESTERLY WALL, SAN CARLOS BOX CANYON.

Showing fault which crosses canyon at line M. Catamaran is at hole 2, line M; other derrick is at hole 3, line K; stagings are at holes 5 and 6, line H.

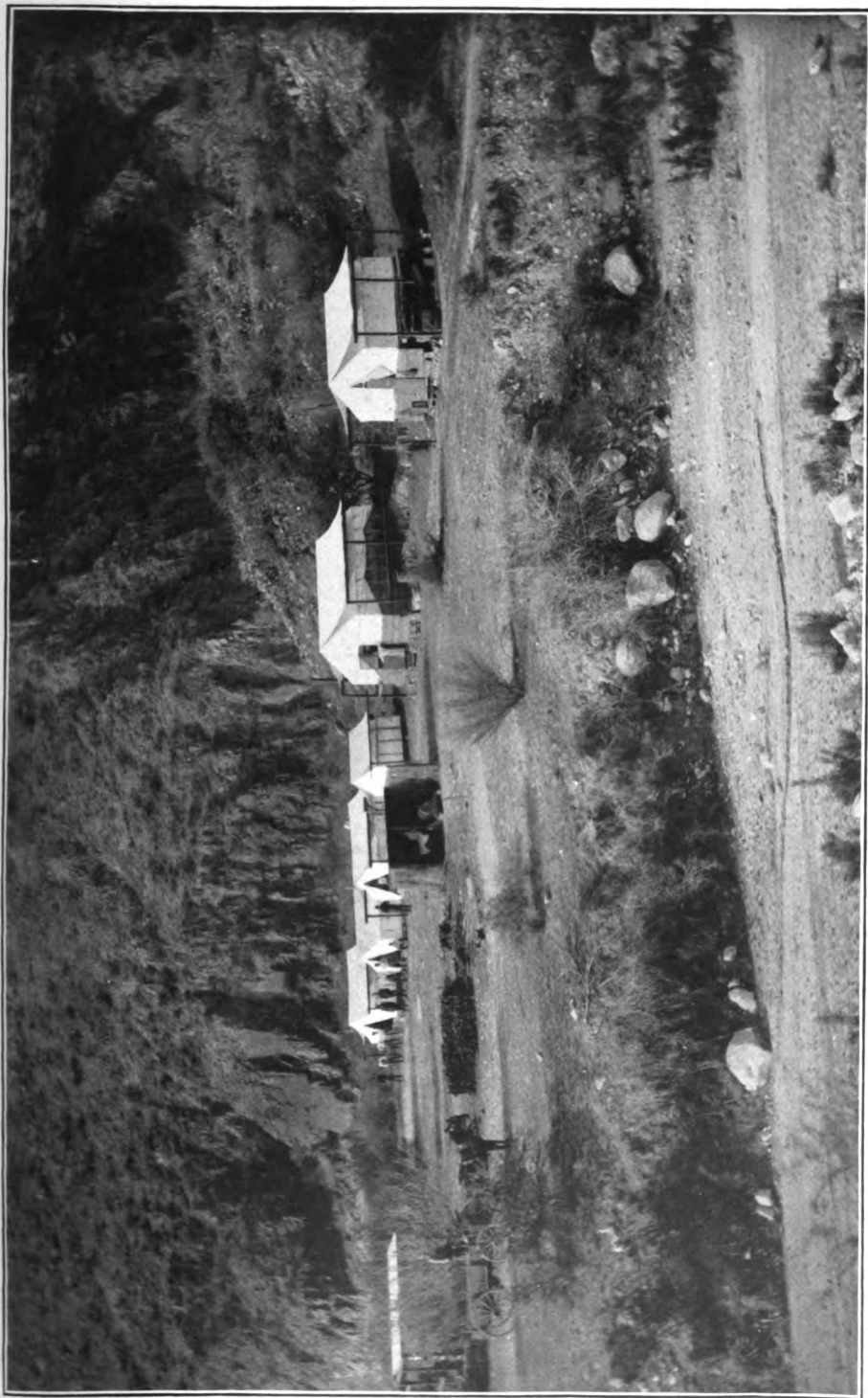


WESTERLY WALL, SAN CARLOS DAM SITES. LOOKING UPSTREAM.

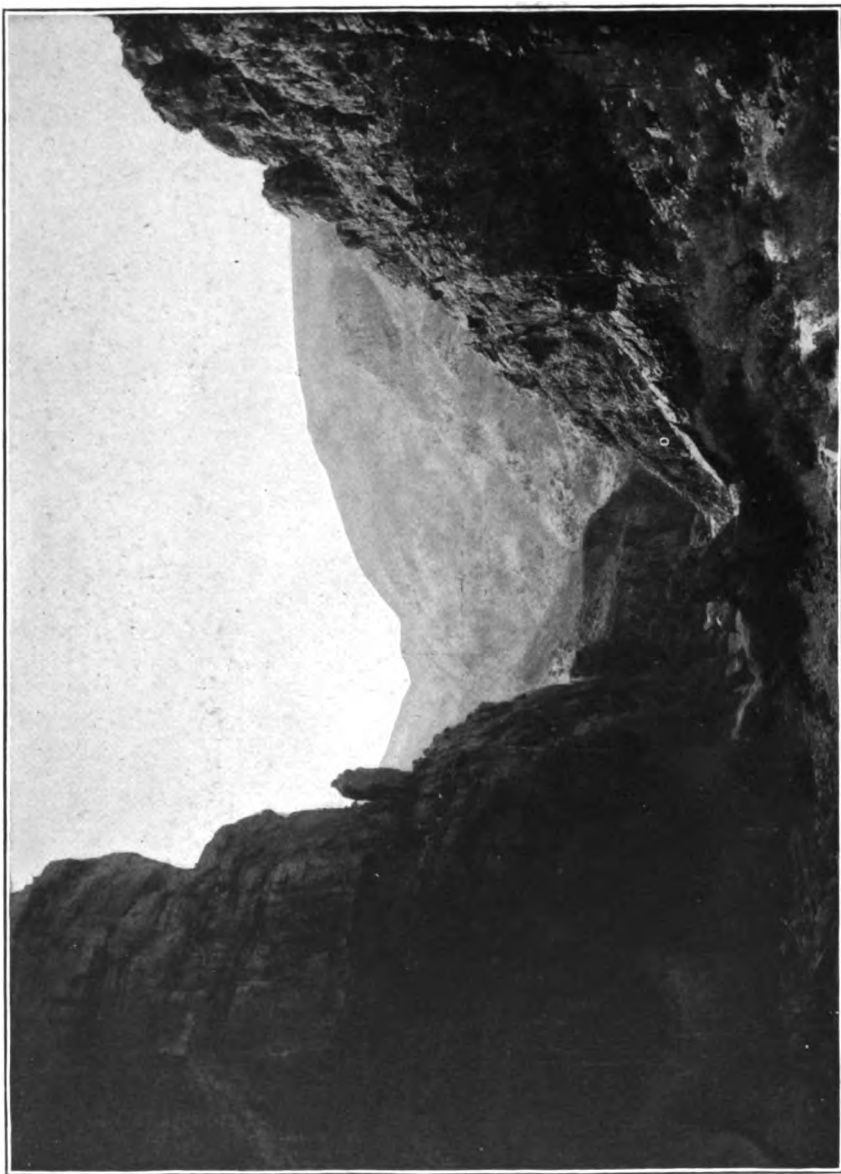
Showing fault which crosses canyon at line C, and to which the fracture shown in Plate 4 probably extends.



DRILLING PLANT AT SAN CARLOS UPPER DAM SITE.

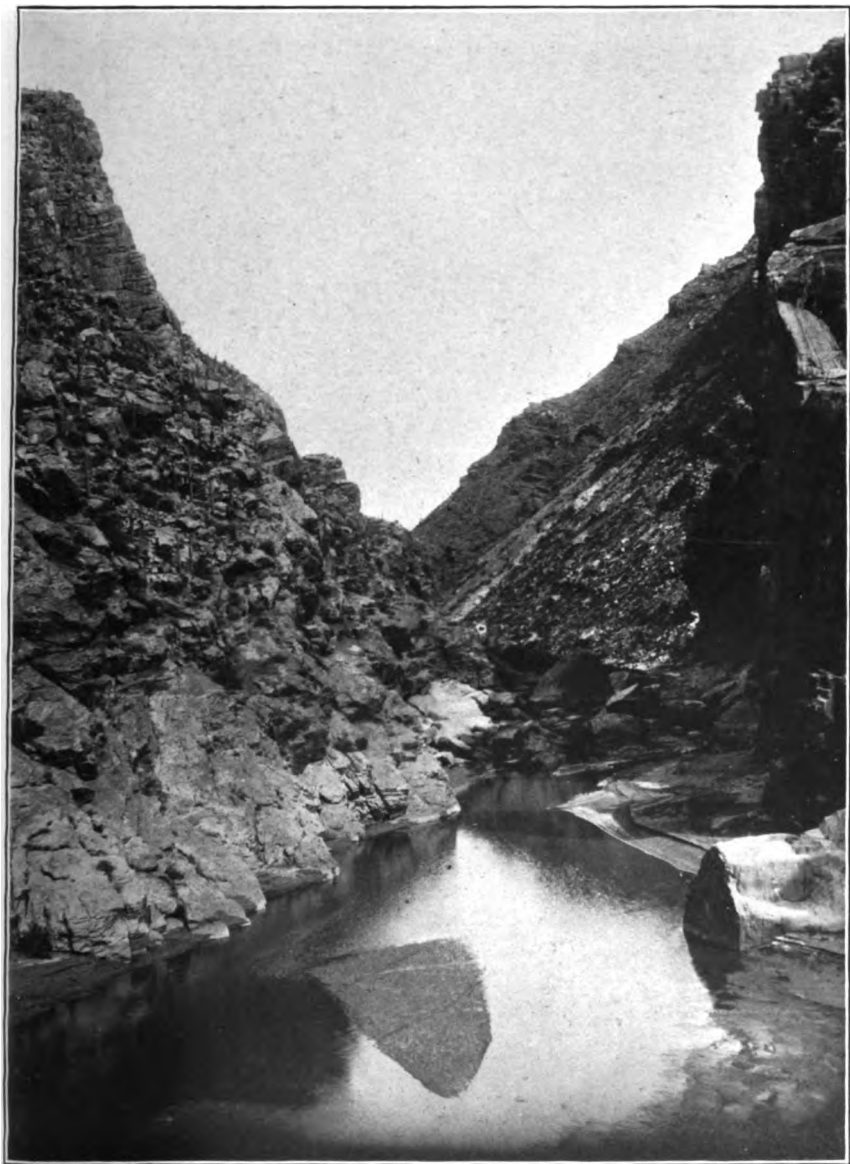


DRILLERS' CAMP, NEAR HEAD OF SAN CARLOS BOX CANYON.



NEEDLES EYE (ON THE GILA RIVER 7 MILES BELOW THE SAN CARLOS DAM SITES), LOOKING DOWNSTREAM.

The marked point on right-bank wall at gorge is 65 feet above water.



NEEDLES EYE, LOOKING UPSTREAM.

The point marked is the same as that marked in Plate 14.

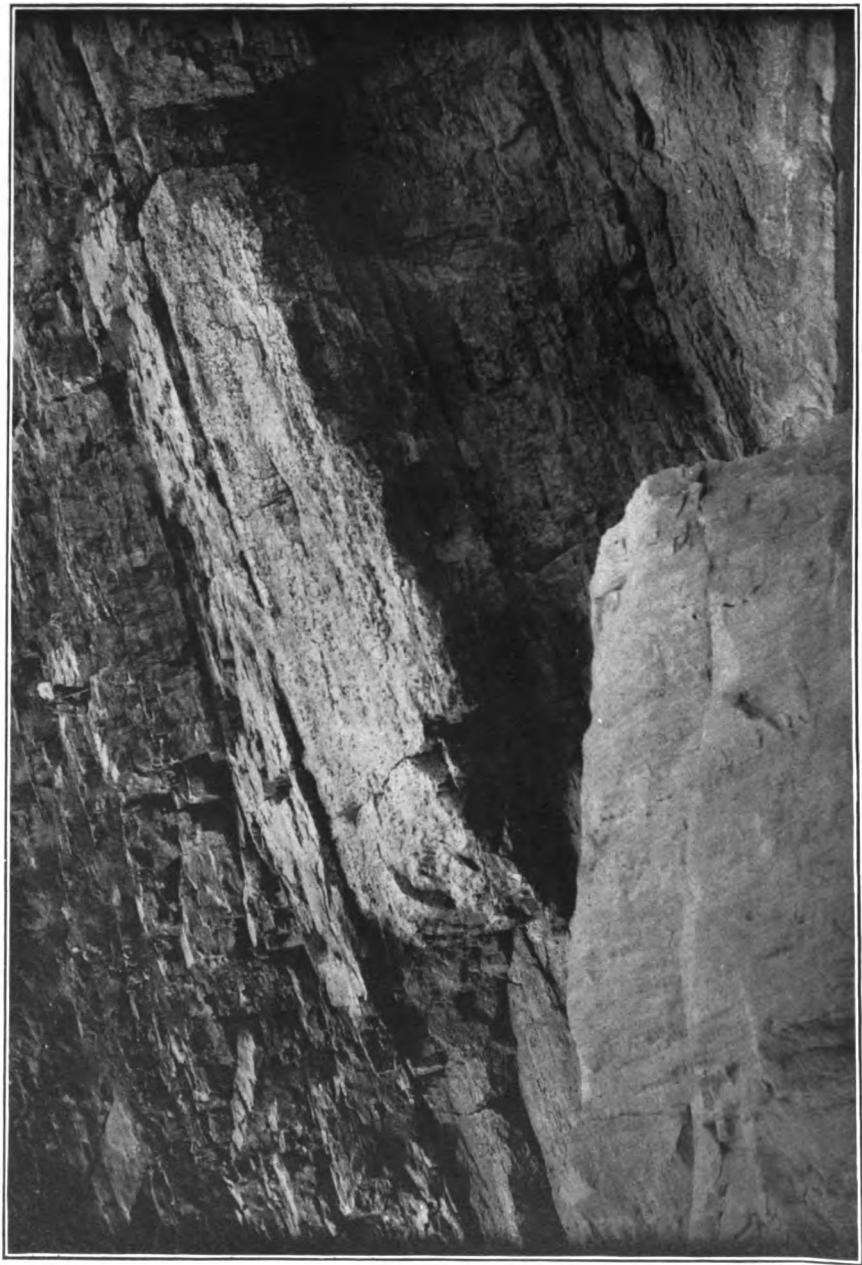


NEEDLES EYE, LOOKING DOWNSTREAM.

Showing the boulders and both walls at the gorge.



NEEDLES EYE.
Wall on left bank of gorge.



NEEDLES EYE.

Wall on right bank of gorge. (The transit near top is the point marked in Plates 14 and 15.

APPENDIX C.

Log of drilling at San Carlos dam site in 1913.

Line.	Hole.	Elevation.	Material.
.....	1	+14.0 to - 2.2	Sand, gravel, and bowlders.
		- 2.2 to - 4.7	Sandstone.
		- 4.7 to - 5.7	Soft sandstone.
		- 5.7 to - 7.5	Sandstone.
.....	2	+ 5.3 to -16.7	Sand, gravel, and bowlders.
		-16.7 to -20.2	Broken sandstone.
		-20.2 to -25.7	Soft sandstone.
.....	3	+ 4.8 to -14.7	Sand, gravel, and bowlders.
		-14.7 to -17.4	Limestone bowlder.
		-17.4 to -18.9	Broken sandstone.
		-18.9 to -20.4	Soft sandstone.
		-20.4 to -28.4	Broken sandstone.
		-28.4 to -30.4	Broken coarse sandstone.
		-30.4 to -31.4	Soft sandstone.
		-31.4 to -34.9	Broken coarse sandstone.
		-34.9 to -42.2	Pebbly coarse sandstone.
		-42.2 to -42.7	Soft sandstone.
.....	4	+ 3.8 to -13.2	Sand, gravel, and bowlders.
		-13.2 to -15.2	Soft sandstone.
		-15.2 to -16.2	Quartzite.
		-16.2 to -17.2	Soft sandstone.
		-17.2 to -19.7	Quartzite.
		-19.7 to -20.2	Soft sandstone.
		-20.2 to -21.2	Broken sandstone.
		-21.2 to -22.2	Soft sandstone.
.....	5	+ 1.9 to -14.8	Sand, gravel, and bowlders.
		-14.8 to -15.5	Broken sandstone.
		-15.5 to -19.5	Shaley sandstone.
		-19.5 to -20.0	Soft sandstone.
		-20.0 to -21.0	Broken sandstone.
		-21.0 to -22.0	Soft sandstone.
		-22.0 to -23.0	Broken sandstone.
		-23.0 to -25.0	Soft sandstone.
		-25.0 to -25.5	Broken sandstone.
		-25.5 to -28.5	Soft sandstone.
.....	6	+ 3.3 to -11.9	Sand, gravel, and bowlders.
		-11.9 to -12.6	Soft sandstone.
		-12.6 to -16.6	Sandstone.
		-16.6 to -18.6	Soft clayey sandstone.
		-18.6 to -25.3	Very soft sandstone.
		-25.3 to -25.8	Clayey sandstone.
		-25.8 to -27.3	Broken sandstone.
		-27.3 to -30.1	Soft sandstone.
		-30.1 to -31.1	Quartzite.
		-31.1 to -31.9	Soft sandstone.
		-31.9 to -32.4	Quartzite.
		-32.4 to -34.4	Clayey sandstone.
.....	1	+ 4.0 to -15.6	Sand, gravel, and bowlders.
		-15.6 to -18.6	Quartzite.
		-18.6 to -20.6	Broken quartzite.
		-20.6 to -23.1	Sandstone.
		-23.1 to -23.6	Soft sandstone.
		-23.6 to -26.6	Broken sandstone.
		-26.6 to -27.6	Soft shaley sandstone.
		-27.6 to -28.6	Sandstone.
		-28.6 to -29.6	Broken sandstone.
		-29.6 to -30.6	Soft sandstone.
		-30.6 to -31.6	Broken sandstone.
		-31.6 to -33.6	Soft sandstone.
		-33.6 to -36.6	Broken sandstone.
.....	2	+ 3.5 to -18.9	Sand, gravel, and bowlders.
		-18.9 to -20.4	Soft sandstone.
		-20.4 to -22.0	Sandstone.
		-22.0 to -22.8	Soft sandstone.
		-22.8 to -25.8	Soft sandstone.
		-25.8 to -27.0	Sandstone.
		-27.0 to -31.7	Soft sandstone.
.....	3	+ 4.2 to -17.3	Sand, gravel, and bowlders.
		-17.3 to -18.8	Soft sandstone.
		-18.8 to -20.3	Broken sandstone.
		-20.3 to -21.8	Soft sandstone.
		-21.8 to -23.5	Broken sandstone.

Log of drilling at San Carlos dam site in 1913—Continued.

Line.	Hole.	Elevation.	Material.
H.....	4	+ 2.9 to -14.1	Sand, gravel, and bowlders.
		-14.1 to -19.4	Sandstone.
		-19.4 to -29.4	Broken sandstone.
		-29.4 to -30.4	Quartzite.
		-30.4 to -38.6	Broken sandstone.
		-38.6 to -40.6	Shaley sandstone.
		-40.6 to -43.1	Broken sandstone.
		-43.1 to -44.1	Soft sandstone.
		-44.1 to -46.1	Sandstone.
		-46.1 to -47.6	Soft sandstone.
		-47.6 to -49.1	Sandstone, pinkish.
H.....	5	+ 2.0 to -13.8	Sand, gravel, and bowlders.
		-13.8 to -15.6	Bowlder.
		-15.6 to -16.3	Sand and gravel.
		-16.3 to -25.0	Quartzite, broken near bottom.
H.....	6	+ 2.0 to -11.5	Sand, gravel, and bowlders.
		-11.5 to -13.3	Quartzite.
		-13.3 to -14.8	Shaley sandstone.
		-14.8 to -16.0	Quartzite.
		-16.0 to -18.2	Soft sandstone.
		-18.2 to -18.5	Quartzite.
		-18.5 to -24.0	Shaley sandstone.
		-24.0 to -24.3	Broken sandstone.
I.....	1	+ 3.6 to - 6.7	Sand, gravel, and bowlders.
		- 6.7 to -13.7	Sandstone.
		-13.7 to -16.2	Sandstone and quartzite.
I.....	2	+ 5.3 to -15.2	Sand, gravel, and bowlders.
		-15.2 to -18.2	Broken sandstone.
		-18.2 to -20.2	Sandstone and quartzite.
I.....	3	+ 3.5 to -21.0	Sand, gravel, and bowlders.
		-21.0 to -29.0	Sandstone.
		-29.0 to -32.0	Hard sandstone.
		-32.0 to -34.5	Quartzite.
		-34.5 to -44.5	Sandstone.
I.....	4	+ 3.7 to -18.7	Sand, gravel, and bowlders.
		-18.7 to -26.7	Hard sandstone.
I.....	5	+ 3.5 to -14.0	Sand, gravel, and bowlders.
		-14.0 to -19.0	Sandstone.
		-19.0 to -24.5	Sandstone and quartzite.
		-24.5 to -26.5	Quartzite.
		-26.5 to -28.5	Sandstone, pinkish.
		-28.5 to -31.0	Broken sandstone.
		-31.0 to -35.0	Sandstone.
I.....	6	+ 2.0 to - 5.0	Sand, gravel, and bowlders.
		- 5.0 to - 9.8	Bowlder, quartzite.
		- 9.8 to -14.2	Sand, gravel, and bowlders.
		-14.2 to -15.3	Soft sandstone.
		-15.3 to -16.7	Broken quartzite.
		-16.7 to -21.8	Quartzite.
I.....	7	+ 1.4 to - 2.8	Sand and gravel.
		- 2.8 to -11.5	Bowlder, quartzite.
		-11.5 to -13.5	Sand and gravel.
		-13.5 to -14.0	Gray sandstone.
		-14.0 to -18.0	Hard sandstone.
		-18.0 to -20.7	Broken sandstone.
		-20.7 to -22.3	Sandstone.
		-22.3 to -24.8	Broken sandstone.
		-24.8 to -27.8	Broken sandstone and quartzite.
		-27.8 to -27.9	Brown conglomerate.
		-27.9 to -29.8	Sandstone and quartzite.
		-29.8 to -35.3	Broken sandstone and quartzite.
I.....	8	+ 1.7 to -13.2	Sand, gravel, and bowlders.
		-13.2 to -19.8	Sandstone.
		-19.8 to -24.3	Quartzite.
I.....	9	+ 2.0 to -10.5	Sand, gravel, and bowlders.
		-10.5 to -21.5	Soft, white sandstone, laminated.
		-21.5 to -24.7	Soft sandstone.
		-24.7 to -34.5	Broken sandstone.
I.....	10	+ 2.0 to - 3.0	Sand, gravel, and bowlders.
		- 3.0 to - 3.1	Bedrock chopped but not drilled.
J.....	1	+ 2.5 to -14.5	Sand, gravel, and bowlders.
		-14.5 to -15.7	Bowlder.
		-15.7 to -15.8	Sand and gravel.
		-15.8 to -22.8	Sandstone.
J.....	2	+ 2.0 to -22.7	Sand, gravel, and bowlders.
		-22.7 to -26.2	Sandstone.
		-26.2 to -27.5	Soft sandstone.
		-27.5 to -30.0	Broken sandstone.
		-30.0 to -35.5	Sandstone.
J.....	3	+ 2.6 to -21.9	Sand, gravel, and bowlders.
		-21.9 to -24.1	Sandstone.
		-24.1 to -25.1	Soft sandstone.
		-25.1 to -30.4	Sandstone.

Log of drilling at San Carlos dam site in 1913—Continued.

Line.	Hole.	Elevation.	Material.
	4	+ 1.2 to -14.8 -14.8 to -16.5 -16.5 to -24.1	Sand, gravel, and bowlders. Sandstone. Quartzite.
	5	+ 0.5 to -11.5 -11.5 to -11.6	Sand, gravel, and bowlders. Bedrock, chopped, but not drilled.
	1	+ 2.0 to -13.0 -13.0 to -13.3 -13.3 to -15.0 -15.0 to -26.5	Sand, gravel, and bowlders. Red sandstone. Quartzite. Soft quartzite.
	2	+ 2.5 to -15.3 -15.3 to -16.2 -16.2 to -23.5 -23.5 to -30.2 -30.2 to -30.8 -30.8 to -33.8 -33.8 to -36.7	Sand, gravel, and bowlders. Bowlder. Sand, gravel, and bowlders. Quartzite. Broken quartzite. Soft sandstone. Broken quartzite.
	3	+ 2.0 to -13.8 -13.8 to -15.8 -15.8 to -17.1 -17.1 to -23.3 -23.2 to -24.6 -24.6 to -25.1 -25.1 to -28.6 -28.6 to -30.6 -30.6 to -41.3	Sand, gravel, and bowlders. Bowlder, quartzite. Sand, gravel, and bowlders. Bowlder, quartzite. Sand and gravel. Bowlder. Red sandstone. Soft sandstone. Broken sandstone.
	4	+ 1.7 to -19.3 -19.3 to -21.8 -21.8 to -33.3 -33.3 to -37.0 -37.0 to -50.3 -50.3 to -59.1	Sand, gravel, and bowlders. Quartzite. Varicolored sandstone, pink and gray. Hard sandstone. Broken sandstone. Sandstone.
	5	+ 2.0 to - 6.0 - 6.0 to -10.0 -10.0 to -13.9 -13.9 to -21.5 -21.5 to -29.0	Sand, gravel, and bowlders. Bowlder, purple quartzite. Sand, gravel, and bowlders. Red sandstone. Quartzite.
	6	+ 2.6 to - 8.6 - 8.6 to - 9.5 - 9.5 to -12.1 -12.1 to -14.1 -14.1 to -16.1 -16.1 to -22.7	Sand, gravel, and bowlders. Bowlder. Sand, gravel, and bowlders. Soft sandstone. Red sandstone. Soft sandstone.
	1	+ 1.2 to -20.0 -20.0 to -23.4 -23.4 to -34.8	Sand, gravel, and bowlders. Altered quartzite. Friction breccia; on fault.
	2	+ 2.0 to -12.7 -12.7 to -14.2 -14.2 to -16.7 -16.7 to -19.7 -19.7 to -34.2	Sand, gravel, and bowlders. Bowlder. Schistose. Yellow soft sandstone. Altered quartzite.
	1	+ 8.1 to + 0.6 + 0.6 to - 0.4 - 0.4 to - 1.9 - 1.9 to - 4.4 - 4.4 to - 5.4 - 5.4 to - 8.4 - 8.4 to -14.4 -14.4 to -17.9	Sand and bowlders. Yellow clay and gravel. Hard yellow clay. Soft gray shale. Soft yellow argillaceous stone. Soft gray shale. Soft dark shale. Soft blue limestone.
	2	+ 0.7 to -12.8 -12.8 to -20.6 -20.6 to -22.8 -22.8 to -23.3 -23.3 to -24.8 -24.8 to -29.8 -29.8 to -31.3 -31.3 to -31.8 -31.8 to -32.8 -32.8 to -33.8 -33.8 to -35.8 -35.8 to -37.3 -37.3 to -41.1	Sand, gravel, and bowlders. Bowlder, dolomite. Sand and gravel. Soft limestone. Very soft limestone. Soft limestone. Limestone. Soft limestone. Broken limestone. Soft limestone. Broken soft limestone. Broken limestone. Soft limestone.
	3	+ 0.5 to -23.3 -23.3 to -24.8 -24.8 to -33.0 -33.0 to -36.0 -36.0 to -40.5 -40.5 to -44.0	Sand, gravel, and bowlders. Bowlder, quartzite. Sand, gravel, and bowlders. Soft limestone. Limestone. Broken limestone.
	4	+ 1.1 to -20.9 -20.9 to -30.7 -30.7 to -33.4 -33.4 to -34.7 -34.7 to -40.2 -40.2 to -41.2	Sand, gravel, and bowlders. Bowlder, dolomite. Sand, gravel, and bowlders. Blue limestone. Soft blue limestone. Soft broken limestone.

Log of drilling at San Carlos dam site in 1913—Continued.

Line.	Hole.	Elevation.	Material.
X.....	5	+ 0.2 to - 7.0 - 7.0 to -15.6 -15.6 to -28.8 -28.8 to -29.3 -29.3 to -29.8 -29.8 to -35.6	Sand, gravel, and bowlders. Bowlder, dolomite. Sand, gravel, and bowlders. Soft lime shale. Broken lime shale. Blue limestone.
X.....	6	+ 0.7 to - 7.8 - 7.8 to -11.8 -11.8 to -14.8 -14.8 to -16.3 -16.3 to -21.8 -21.8 to -23.3 -23.3 to -26.8 -26.8 to -28.1	Sand and gravel. Blue clay and gravel. Soft lime shale; churn-drilled. Broken soft limestone. Soft and broken lime shale. Broken shale. Soft lime shale. Broken shale.
A.....	4	+ 1.0 to -26.0 -26.0 to -28.5 -28.6 to -31.7 -31.7 to -35.9 -35.9 to -36.7 -36.7 to -39.2 -39.2 to -41.8 -41.8 to -48.5	Sand, gravel, and bowlders. Bowlder (blasted). Do. Bowlder (drilled). Sand and gravel. Bowlder (drilled). Sand and gravel. Soft broken limestone.
A.....	5	+ 1.1 to -26.6 -26.6 to -28.8 -28.8 to -35.9 -35.9 to -39.7 -39.7 to -40.7	Sand and gravel. Bowlder (drilled). Sand, gravel, and bowlders. Soft limestone. Very soft limestone.
A.....	6	+ 0.6 to -17.6 -17.6 to -23.0 -23.0 to -28.2 -28.2 to -29.4 -29.4 to -30.4 -30.4 to -31.9 -31.9 to -33.4 -33.4 to -36.4	Sand, gravel, and bowlders. Bowlder, limestone. Sand, gravel, and bowlders. Sand and yellow clay. Sand and gravel. Compact gravel. Blue limestone. Soft blue limestone.

NOTE.—The sandstone being quartzitic of varying hardness, there was no definite rule available to the driller for distinguishing between it and the quartzite, hence in case of the harder rocks the two terms were used to some extent interchangeably.

The term "broken sandstone" does not mean separated rocks, but presence of such incipient seams as would result in partings of the core while drilling. As a result of such partings with oblique fracture, the wedge-shaped fragments, driven down by their own weight and by the downward rushing water, would become locked in the core barrel, thereby grinding themselves and the core beneath. Thus frequent removal was required in hard rock; but in softer rock the grinding was often allowed to continue, since progress of work was more desired than additional length of core, since the character of rock was fully known, not only from the cores recovered and the sludge, but also from the outcroppings of the same dipping strata visible in the side walls upstream.

The softer sandstones had about the hardness of a grindstone, and as much as 10 feet per eight-hour day was drilled in them. As much as 13 feet was drilled in 8 hours in the soft limestone at the lower dam site.

In the 44 holes drilled, the aggregate amount of drilling through sand, gravel, and bowlders was 891.2 feet. The total amount of diamond drilling through bowlders was 77.2 feet and in bedrock 582.6 feet. The amount of core saved was 343.1 feet, or 59 per cent. In sinking through bowlders, 449 charges of dynamite were fired, ranging from one-half stick to 15 sticks each.

The drilling was by hand power with "Bravo" drill No. 1546, made by Sullivan Machinery Co., of Chicago. The 16 diamonds used weighed $35\frac{1}{4}$ carats in the beginning and $25\frac{1}{4}$ carats at the close of the work.

The cores, $1\frac{1}{8}$ inches diameter, are arranged in their proper order in marked compartments of trays in boxes, locked, and now stored at the San Carlos Agency. The record books and the markings on boxes and cores, read together, will give the holes and depths from which the cores were obtained.

The work throughout was in charge of Mr. W. E. Jones.

D. E. HUGHES.

31679°—H. Doc. 791, 63-2—6

APPENDIX D.

TYPE AND DESIGN OF DAM.

1. Whether the type should be the overfall, or a higher dry-top dam with spillway past one or both ends, is a question which for the site in mind has not a decisive answer. Though the overfall type would be some 10 feet lower, yet the pressures, both horizontal and upthrust, in times of maximum floods would be nearly as great, requiring about as much masonry. It is a matter of topography whether the excavations to be made in quarrying stone for the dam would of themselves afford sufficient passageway for floods past the ends of the dam. At the upper site such quarrying, if confined to the east side, would provide 300 feet of spillway at an elevation of 180 feet.

2. The usually stated objections to an overfall high dam are two. One is that there may not be room for a power plant out of reach of the waters or its spray except by going some distance downstream, which would require that the penstock be long and costly. But it must be remembered that so seldom and for such short periods would floods more than fill the San Carlos Reservoir, that resulting inconvenience, if that were all, could be easily borne, and that a power house could be built to withstand much punishment even of water temporarily passing over its roof. A modern idea is to economize by molding power rooms within the body of the dam; but with a dam so high nothing should be allowed in its design which would weaken the structure—possible earthquakes as well as static forces considered. The other objection is the vibration which has resulted with some overfall dams, threatening their permanency. It is believed that such vibration is induced by the falling waters entraining air causing a partial vacuum next the dam into which the outside air periodically breaks through the descending sheet only to be entrained again, causing pulsations, and that to wholly avoid vibration it is only necessary to so form the face of the dam that maximum floods would, in vacuo, bear upon it all the way down with some pressure but without shock and be guided into the horizontal direction by a vertical curve at the toe of the dam, for it would seem that water alone, free from waves and flowing from a reservoir which regulates its amount, is as constant a force as gravity itself. It is sometimes asked what becomes of the great energy of the descending water if not expended destructively in eroding bed and banks and in creating vibration, to which is answered that with the aid of standing waves ahead it is converted into heat, raising the temperature such fraction of a degree as the fall is part of 778 feet.

3. Yet if cost with separate spillway be not much in excess that type would be chosen to better follow usual practice.

4. The design of the dam is curved in plan, with a radius of 500 feet, for the length of the dam is not so great but that the arch action would add safety to the gravity section were that required, and the arch form is the current practice for dams so short.

5. The form of cross-section to be a "gravity section" so called results from comparatively simple calculations into which enter the weights of materials and intensities of pressures. The only room for judgment is as to amount and distribution of upthrust to be provided against and amount of water to be passed in maximum floods.

6. The resultant of all forces under all the varying conditions should not fall outside the middle third of base if tension in masonry is to be avoided. This is strictly true only if yielding by compression is proportional to load. It is often written that to have the resultant fall within the middle third of base insures a factor of safety of 2 against overturning, but this is not true except in special cases. The resultant may fall on the one third point and yet the factor of safety be even less than $1\frac{1}{2}$; but it is still safe enough, for gravity is so true that 10 foot-pounds never overcame 11 foot-pounds, though the margin of safety was but 10 per cent.

7. As stated above, the principal unknown quantity is the possible upthrust. The writer would in the present case assume a full upthrust under the heel diminishing uniformly to zero at the toe.

FLOOD FLOW AND SPILLWAY.

12. Water Supply Paper No. 33, on page 35, states that the greatest flood at the Buttes up to that time was that of February 22, 1891, which was calculated to be 102,566 cubic feet per second. On page 72 of same paper, 83,620 cubic feet per second was considered the maximum flood discharge of the Gila at San Carlos. Since the date of paper 33 (1899), one greater flood is known to have occurred—that of 1905. Mr. A. C. Sieboth, of Florence, states that high-water marks made by this flood between Florence and the Buttes indicated a flow of 190,000 cubic feet per second. During the present investigation, lodged drift wood has been found at San Carlos several hundred feet upstream from the proposed dam site, at an elevation of 26 feet above low water in the river alongside; which indicates a flow of possibly as much as 150,000 cubic feet per second at that point.

13. The floods of the Gila are characterized by rapid rise and short duration, with flow seldom reaching 50,000 cubic feet per second, which, considering the moderating effect of the reservoir with area so extensive, would be accommodated by a small spillway.

14. The spillway proposed is at elevation 180, or 10 feet below the crest of dam, and its length is 300 feet. The discharge with water 10 feet above it, would be about $3\frac{1}{2}$ by $10\frac{1}{2}$ by $300 = 33,000$ cubic feet per second.

15. The area of reservoir within the 180 or 190 foot contours will probably always be as great as 10,000 acres; for, though it is not proposed to desilt more than about 7,000 acres, the highest levels will have water so seldom that the amount of silting in them will be negligible, except at the extreme upper end of the reservoir where such level is within reach of the river and its delta building work.

16. Considering how flashy the floods, and that 10,000 acres even without an outlet would require a continuous flow of 50,000 cubic

feet per second for 24 hours to raise it 10 feet, there remains no doubt of the sufficiency of the proposed spillway for all ordinary floods.

17. It is interesting to determine the behavior of such reservoir and such spillway under some hypothetical greater flood. Hence, assume that the outlet through the dam will discharge the ordinary flow of the river, and that when the reservoir is full, or by the time it becomes full, a flood inflow shall amount to 50,000 cubic feet per second in excess of the ordinary flow, and shall increase hourly 5,000 cubic feet per second for 10 hours, making a maximum of 100,000 cubic feet per second, and then decrease hourly 5,000 cubic feet per second for 20 hours, or down to normal flow. The resulting hourly heights would be as tabulated below:

Number of hour.	Inflow during hour.	Average outflow during hour.	Rise due to inflow.	Fall due to outflow of spillway.	Net height attained.
	<i>Cubic feet per second.</i>	<i>Cubic feet per second.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
0	-----	0	0.000	0.000	0.00
1	55,000	147	.455	.001	.45
2	60,000	628	.496	.005	.94
3	65,000	1,398	.537	.012	1.47
4	70,000	2,462	.579	.020	2.03
5	75,000	3,735	.620	.031	2.62
6	80,000	5,266	.661	.044	3.24
7	85,000	7,053	.703	.058	3.88
8	90,000	9,102	.744	.075	4.55
9	95,000	11,215	.785	.093	5.24
10	100,000	13,915	.828	.115	5.96
11	95,000	16,525	.785	.137	6.60
12	90,000	19,031	.744	.157	7.19
13	85,000	21,351	.703	.176	7.71
14	80,000	23,537	.661	.194	8.18
15	75,000	25,563	.620	.211	8.59
16	70,000	27,271	.579	.225	8.94
17	65,000	28,776	.537	.238	9.24
18	60,000	30,116	.496	.249	9.49
19	55,000	31,183	.455	.258	9.69
20	50,000	32,016	.413	.265	9.84
21	45,000	32,657	.372	.270	9.94
22	40,000	33,055	.331	.273	10.00
23	35,000	33,225	.299	.275	10.01
24	30,000	33,160	.248	.274	9.98
25	25,000	32,955	.207	.272	9.92
26	20,000	32,558	.165	.269	9.82
27	15,000	31,966	.124	.264	9.68
28	10,000	31,183	.083	.258	9.50
29	5,000	30,261	.041	.251	9.29
30	0	29,157	0	.241	9.05

It appears from the above table that the spillway would just care for the hypothetical flood therein assumed, and that in the twenty-third hour the water would be at its highest. Also that it would be at elevation 9.05 feet at the close of the flood. Water would continue to pass at a decreasing rate over the spillway for 76.6 hours after the flood inflow had ceased.

18. If water were 20 feet over the 300 feet of spillway and 10 feet over 506.73 feet of dam, the discharge would be 93,915 cubic feet per second over spillway and 56,085 cubic feet per second over dam, making 150,000 cubic feet per second discharge, besides whatever amount would be discharging through the outlet conduits. That so great a flood should come on a full reservoir and continue so long that the reservoir would cease to moderate the flow, is less to be expected than a destructive earthquake. Nevertheless that height

of water, namely, 10 feet above the dam, or to elevation 200, has been assumed in designing the dam; and the structure would continue to be stable with the water higher still.

CROSS SECTION OF DAM.

19. The elements which enter into the problem are as follows:
 Water, assumed to weigh $62\frac{1}{2}$ pounds per cubic foot, extending $\frac{1}{2}$ feet above the dam, pressing on upstream face from bedrock to crest;
 Water under dam lifting with full head at the heel, diminishing uniformly to zero under the toe;

No additional downstream pressure from sand or silt;

No upstream pressure except that of wind assumed to be W pounds per square foot.

Dam masonry assumed at 150 pounds per cubic foot.

Resultant in no case to fall outside the middle third of base, but under extreme conditions to fall on the one-third points.

Because the cross section of the gorge is substantially V-shaped, and because the dam is to be adapted to possible overfall, the batter lines will be made straight, and not in concave curves, which otherwise would be justified.

20. The dam, though of gravity section, making it safe if it were straight, is curved in plan, with radius of 500 feet to upstream line of top. The curved form is supposed to adjust itself better to temperature changes. It also, by arch action, reinforces the stability resulting from the gravity section. Even without arch action, the curved dam, if to any degree monolithic or has its parts interlocked, would be, like a worm fence, harder to overturn. Since in straight dams calculations are made on a section a unit long, it has been urged that in similar calculations on curved dams the planes limiting the unit section should not be parallel but radial, and that such convergence of planes makes relatively more area on the back to receive water pressure and less area and material at the toe to withstand the thrust, thus reducing the efficiency of the gravity section. But this is faulty reasoning. It can be as well imagined that the planes a unit apart are all parallel to the median plane, which would make the middle unit section, if standing alone, of the same stability it would have if the dam were straight; and make all other sections stronger because of the obliqueness. For example: Examine a unit section situated d° on either side of the center. Its back, which receives normal water pressure, is more than a unit, being $u \sec d^\circ$, but the pressure upon it, $pu \sec d^\circ$, is resolvable into two components, one being $Pu \sec d^\circ \cos d^\circ = Pu$, directed downstream, and having more masonry and longer base to resist it than in a straight dam; and the other component being $Pu \sec d^\circ \sin d^\circ = Pu \tan d^\circ$, directed normally toward the median plane, having no downstream overturning moment, but a side pressure with resulting friction and viselike hold through which the stability of the central sections, already as great as in a straight dam, is augmented by a fraction of the excess stability of the outer sections, making the whole more efficient as a gravity section than the same section would be in a straight dam, and this without invoking any arch action pushing on the abutments at all.

21. We can therefore calculate for a straight dam with full confidence that curving the dam will not only introduce the arch action ever ready to assist gravity, but will by virtue of the curvature alone increase the efficiency of the gravity section and make the dam, though severed from the abutments, harder to overturn.

22. What must be the top width of a trapezoidal dam section to accommodate parabolic curve of discharge for water h feet above its crest?

Mean velocity = $\frac{2}{3}\sqrt{2gh}$, $y = \frac{2}{3}\sqrt{2ghx}$, and $x = \frac{1}{2}gt^2$, whence

equation of the parabola is $y^2 = \frac{16hx}{9}$, and $\frac{dy}{dx} = \frac{16h}{18y}$. Since down-

stream slope of dam will be in the neighborhood of 6 on 5, let

$\frac{16h}{18y} = \frac{5}{6}$, whence $y = \frac{16h}{15}$ and $x = \frac{16h}{25}$. Hence, since width at

$\frac{16h}{25}$ below top must be $\frac{16h}{15}$ and since the slope is assumed at $\frac{6}{5}$, the

width at top will be $\frac{16h}{15} - \frac{5}{6}$ of $\frac{16h}{25} = \frac{8h}{15}$.

23. Now, what shall the depth of overflow, or h , be assumed to be? It, of course, depends on length of overfall and quantity of water to be discharged. The quantity can not be definitely known; we can only judge by the past. By far the greatest flood ever known was that of 1905. It has been stated by an engineer that high-water marks left by that flood between Florence and the Buttes indicated a maximum flow there of 190,000 cubic feet per second. The writer has found driftwood lodged 26 feet above low water in the river several hundred feet above the dam site, which would mean a flow at the time of about 150,000 cubic feet per second, which is not out of harmony with the reported flow of 190,000 at Florence, for the San Pedro is said to have been in flood at the same time. But it can be argued that the chance for a repetition of such flood is small and that the chance of its occurring on a full reservoir is much smaller, and that the chance of its continuing so long that the storage room even on top of a full reservoir would not reduce the maximum flow at the dam would be very much smaller still, making of the combination a chance so remote that it would not be necessary to provide against so great an overfall as 150,000 cubic feet per second. The writer would not expect 50,000 cubic feet per second to ever pass the dam, and were only the cost of dam subject to risk, he would consider the question of insurance and would not expend much money toward providing against an overfall greater than 50,000 cubic feet per second. But in a case like this, where a failure of the dam would be so appalling in loss of life and in loss of property many times the cost of dam, the engineer is not warranted in assuming less than 150,000 cubic feet per second as a possible maximum flow.

24. To pass 150,000 cubic feet per second would require a spillway 500 feet long with water nearly 20 feet above its crest, or else 300 feet of spillway with 20 feet of water together with 500 feet of dam with 10 feet of water over it.

25. The board having decided on a dam storing to an elevation of 180 feet, and having proposed spillways past its ends with crests at 180 feet on which movable gates may be added at some future time, and having suggested that the dam be 10 feet higher, or to elevation 190, but with top and downstream face of form suitable to pass possible floods in excess of the capacity of the spillways—it is assumed as a limit for purpose of calculation, a flow of 150,000 cubic feet per second, of which about 95,000 would be passing over spillways 300 feet long and 55,000 over 500 feet of dam, requiring a head of about 20 feet above the spillways and 10 feet above the dam, or water to an elevation of 200 feet.

26. While there would be room on the dam and in the excavations at its ends for more than 500 feet of overfall and 300 feet of spillways, yet there would be towers and, in time, possible bridge piers also, on the dam and its approaches to obstruct the flow.

27. From the above considerations it will be assumed in the calculations of the dam that water may rise 10 feet above its crest, making the h on page 6 (par. 22) equal to 10 feet. Hence, necessary top width to accommodate the parabolic curve suitable for a head of 10 feet is $8/15 \times 10 = 5\frac{1}{3}$ feet. But to the $5\frac{1}{3}$ feet should be added 4 feet or more to provide for chamfer of upstream edge, making 10 feet in all. If bridge piers on the dam be needed, they could spring from an elevation 12 feet lower, where the width is 10 feet greater, making 20 feet in all. A narrower width at and near the top would make an arch that would deflect so much that it would not be of help to the gravity section.

28. It may be argued with reason, that inasmuch as a height of water 10 feet above the dam is so improbable, it would be regarded sufficiently safe to make a cross-section which, with water only 5 feet or even less above the crest, would give a resultant intersecting the base at the one-third point, and let the resultant, if the water should go higher, fall a little outside the middle third; for the dam would not fail until the resultant had reached nearly to the toe, unless the masonry or rock foundation should fail through crushing, or unless the cohesion of masonry be insufficient to withstand the tension that would then occur in the upstream face, and along the base toward the toe. But it is better to make a design absolutely safe and to assume water 10 feet above the crest or 200 feet above datum, or 220 feet above the foundation, which will be done in the numerical work to follow.

29. In the figure on page 8 the single equivalent of all the vertical forces is in magnitude equal to Forces $(1 + 2 + 3 + 4 - 6)$, and its point of application is distant horizontally from the toe of the dam =

$$\frac{\text{Moments } (1 + 2 + 3 + 4 - 6)}{\text{Forces } (1 + 2 + 3 + 4 - 6)}$$

The above equivalent, when combined with force 5, will have an oblique resultant which, under the conditions imposed, is to pass through the one-third point next the toe. The triangle of forces being similar to the triangle formed with the intercept of the base by

the vertical and oblique force lines, prolonged if necessary, there results the following proportion:

$$\text{Forces } (1+2+3+4-6) : \text{Force } 5 :: \frac{H(H+3h)}{3(H+2h)} :$$

$$\frac{\text{Moments } (1+2+3+4-6)}{\text{Forces } (1+2+3+4-6)} - \frac{1}{3} (B+T+b)$$

from which, after reduction, the following general equation results:

$$\left. \begin{array}{l} + (gH - H - h) B^2 \\ + T(3gH - 2H - 2h) B \\ + (Hg - 2h) Bb \\ - (2Th) b \\ - (h) b^2 \\ + (gH - H - h) T^2 \\ - (H + 3h) H^2 \end{array} \right\} = 0 \quad \text{Eq. 1.}$$

30. In the same figure, page 8, when reservoir is empty and wind is blowing upstream, we have again an oblique resultant, which by the conditions imposed is to pass through the one-third point next the heel. Here the equivalent of the vertical forces is in magnitude = Forces (1+2+3), and its point of application is horizontally distant from the heel

$$\frac{\text{Moments } (1+2+3)}{\text{Forces } (1+2+3)},$$

the lever arms in this case being the whole base ($B+T+b$), less the lever arms given on page 8. This equivalent, combined with force 7, gives the required resultant; and from similar triangles, as before, the following proportion obtains:

$$\text{Forces } (1+2+3) : \text{Force } 7 :: \frac{H}{2} : \frac{\text{Moments } (1+2+3)}{\text{Forces } (1+2+3)} - \frac{1}{3} (B+T+b),$$

which reduced gives the following equation:

$$Bb + 3Tb + b^2 + T^2 - \frac{3WH}{g} = 0 \quad \text{Eq. 2.}$$

31. The above equations, 1 and 2, are perfectly general, each containing the two unknown quantities B and b ; and the two are simultaneous for any given values of g , H , h , T , and W . The two equations can be, of course, solved for values of B and b in the general terms of g , H , h , T , and W , but it is simpler to first introduce the assigned numerical values of g , H , h , T , and W into both equations and solve for B and b afterwards.

32. Eliminating B from equations 1 and 2, there results.

$$\begin{array}{rcl}
 + \left[\left\{ 3W \left(1 - \frac{2}{g} \right) + (H + 3h) \right\} H + 2 \left(\frac{2h}{H} + 3 - g \right) T^2 \right] & + 4T \frac{b^4}{b^2} & \\
 + \left[\left(\frac{4h}{H} + 4 - 3g \right) T^2 + \left\{ 3H - \frac{4}{g}(H + h) \right\} 3WT \right] & b^2 & \\
 + (1 + \frac{h}{H} - g) & T^4 & \\
 + \frac{(g-1)H-h}{g^2} (2gT^2 - 3WH) 3W & & \\
 & & = 0 \text{ Eq. 3}
 \end{array}$$

Assigning numerical values: $H=210$; $h=10$; $T=10$; $g=2.4$; and $W=.8$ (which is 0.8 of $62\frac{1}{2}=50$ pounds per square foot); and solving, gives $b=.5367$ feet, and $B=174.42$ feet, making the whole base $= 0.5367 + 10 + 174.42 = 184.96$ feet. Had W been $8/21$ (or 23.8 pounds per square foot) b would have become zero. In view of the fact that wind pressure would be omitted by the board, and that it usually is omitted in dam design, in the following discussion b will be made zero (which provides for about 24 pounds wind pressure) unless batter shall be required toward the base to limit stress in masonry.

33. To determine necessary batter for different heights:

Assume $H=210$; $h=10$; $T=10$; $g=2.4$; $b=0$. Whence by Eq. 1 $284 B^2 + 10,720 B + 28,400 - 1,058,400,000 = 0$, from which $B=174.84$, and whole base $= 10 + 174.84 = 184.84$.

Assume $H=200$; $h=10$; $T=10$; $g=2.4$; $b=0$. $27 B^2 + 1,020 B + 2,700 - 920,000 = 0$. $B=166.40$, and whole base $= 10 + 166.40 = 176.40$.

Assume $H=150$; $h=10$; $T=10$; $g=2.4$; $b=0$. $200 B^2 + 7,600 B + 20,000 - 4,050,000 = 0$. $B=124.22$ and whole base $= 10 + 124.22 = 134.22$.

Assume $H=100$; $h=10$; $T=10$; $g=2.4$; $b=0$. $130 B^2 + 5,000 B + 13,000 - 1,300,000 = 0$. $B=82.11$, and whole base $= 10 + 82.11 = 92.11$.

Assume $H=50$; $h=10$; $T=10$; $g=2.4$; $b=0$. $60 B^2 + 2,400 B + 6,000 - 200,000 = 0$. $B=40.28$, and whole base $= 10 + 40.28 = 50.28$.

With uniform batter for the 210 feet we have—

for $200'B = \frac{200}{210}$ of $174.84 = 166.52$ which is 0.12' greater than the 166.40;

for $150'B = \frac{150}{210}$ of $174.84 = 124.89$ which is 0.67' greater than the 124.22;

for $100'B = \frac{100}{210}$ of $174.84 = 83.26$ which is 1.15' greater than the 82.11;

for $50'B = \frac{50}{210}$ of $174.84 = 41.63$ which is 1.35' greater than the 40.28.

34. It appears therefore that a straight batter will not result in much excess strength at any height in this case, which assumes similar upthrust at every height within the masonry. It is impossible that masonry would be so poor as to permit so much upthrust within itself, but it must be remembered that each height has its ends on the sloping walls of the canyon where upthrust is just as likely to occur as on the very lowest part, hence requiring that the ends, if not the center, of each zone in height shall be of cross sections as calculated above. To reduce only the central portions of each zone, leaving its ends of larger size, would introduce a complexity impracticable to follow in dam construction.

35. But we must examine whether the straight batter figured above as 174.84 in 210 (practically 6 on 5), will result in excessive compression in either the masonry or the rock foundation, and whether the direction of the resultant is within the angle of friction.

36. Referring to figure on page 8—

$$\theta = \tan^{-1} \frac{\text{Force 5}}{\text{Forces } 1+2+3+4-6} \text{ and}$$

$$R = \text{Force 5} \div \sin \theta \text{ or } \sqrt{(\text{Forces } 1+2+3+4-6)^2 + (\text{force 5})^2}$$

Reducing gives:

$$\left. \begin{array}{l} \text{With up-} \\ \text{thrust} \end{array} \right\} \begin{array}{l} \tan \theta = \frac{H+2h}{(B+T+b)\left(g-1-\frac{h}{H}\right)+b+gT} \\ R = \frac{(H+2h)H}{2 \sin \theta} = \frac{1}{2}H \\ \sqrt{\left[(B+T+b)\left(g-1-\frac{h}{H}\right)+b+gT\right]^2 + [H+2h]^2} \end{array} \quad \begin{array}{l} \text{Eq. 4.} \\ \text{Eq. 5.} \end{array}$$

Assume $H=210$; $h=10$; $T=10$; $g=2.4$; $b=$; $B=174.84$; and there results $\tan \theta = 0.8295$ and $R = 37562.7$; which latter, since in the formulæ water=unity, must be multiplied by $62\frac{1}{2}$, making 2347669 lbs. = 1173.835 tons. Combining vertical component and uniform shear gives 10.55 tons per square foot for maximum oblique compression at the toe, or 12.71 tons if shear increases uniformly from 0 at the heel.

37. The above includes upthrust which operates to increase $\tan \theta$ and to diminish R . If through good fortune the upthrust should not prevail, then

$$\theta = \tan^{-1} \frac{\text{Force 5}}{\text{Forces } 1+2+3+4} \text{ and}$$

$$R = \text{Force 5} \div \sin \theta \text{ or } \sqrt{(\text{Forces } 1+2+3+4)^2 + (\text{force 5})^2}$$

which reduce to—

$$\left. \begin{array}{l} \text{Without up-} \\ \text{thrust} \end{array} \right\} \begin{array}{l} \tan \theta = \frac{H+2h}{g(B+2T+b)+b} \\ R = \frac{(H+2h)H}{2 \sin \theta} = \frac{1}{2}H \\ \sqrt{[g(B+2T+b)+b]^2 + [H+2h]^2} \end{array} \quad \begin{array}{l} \text{Eq. 6.} \\ \text{Eq. 7.} \end{array}$$

38. From equations 6 and 7, and the same values as above of $H=210$; $h=10$; $T=10$; $g=2.4$; $b=0$; $B=174.84$, there results $\tan \Theta = .4919$ and $R=54717.6$, intersecting base 87.10 feet from toe, resulting in 10.55 tons per square foot maximum oblique compression at the toe if upthrust should not occur, and if shear (= to force 5) be uniformly distributed; or 12.71 tons if shear increases uniformly from zero at the heel.

39. It is needless to deduce equations for obliquity and magnitude of maximum pressure at the heel, for it must be nearly vertical, and its amount can but little exceed the weight of a column of masonry a foot square and as high as the dam, or $210 \times 150 \div 2000 = 15.75$ tons per square foot.

40. It appears then that in either event the pressures are all safe, being well within the 20 tons which is the usually accepted limit in modern practice.

41. It also appears that in the event of upthrust of the assumed amount and distribution, making $\tan \Theta = .8395$, something more than the friction of plane surfaces is required to prevent sliding, and reliance must be in part on cohesion of masonry, and on anchorage in foundations and abutments. At the San Carlos Dam site the downstream convergency of the abutments would alone insure against sliding.

42. Let it be determined what would be the effect on the proposed dam of 184.84 feet base if upthrust instead of being full at the heel, diminishing uniformly to zero at the toe, should continue uniformly full to the toe. Force 6 on page 8 would then become $(H+h)(B+T+b)$ with lever arm of $\frac{1}{3}(B+T+b)$; and the resultant of all vertical forces would be forces $1+2+3+4-6$; and its lever arm would be

$$\frac{\text{Moments } 1+2+3+4-6}{\text{Forces } 1+2+3+4-6}$$

Assuming $H=210$; $h=10$; $T=10$; $g=2.4$; $b=0$; $B=174.84$; the above vertical resultant becomes

$$\frac{2.4 \times 174.84 \times 210}{2} + 2.4 \times 10 \times 210 - (210 + 10)(174.84 + 10 + 0) =$$

8434.88 units of $62\frac{1}{2}$ pounds; and the lever arm becomes

$$\left[\frac{2.4 \times 174.84 \times 210}{2} \left(\frac{2}{3} \frac{174.84}{1} \right) + (2.4 \times 10 \times 210)(174.84 + 5) - (210 + 10)(174.84 + 10) \right] \div 8434.88 = 270.75 \text{ feet.}$$

Force 5 = 24150, with lever arm of 73.04 feet.

$8434.88 : 24150 :: 73.04 : (209.12)$, which is $270.75 - 209.12 = 61.63$ from toe; which is the one-third point as before.

But now $\tan \Theta = 2.863$, and friction must receive great help from anchorages, or cohesion, or arch action, or downstream convergency of abutments, to prevent sliding. The oblique compression at the toe is now 8.64 tons per square foot.

The moment of stability, if the dam were straight, is now but 9.4 per cent in excess of the overturning moment, but the resultant falls on the one-third point, and the dam will stand if sliding be prevented.

43. Let it be found how much, if any, tension per square foot would exist across the bottom of a vertical plane parallel to the length of the dam and situated at a distance d from the toe, assuming full upthrust at the heel, diminishing uniformly to zero at the toe, and that $H=210$; $h=10$; $T=10$; $g=2.4$; $b=0$; $B=174.84$; which assumptions, as heretofore shown, make resultant intersect at the limit of the middle third of the base. In this case, assuming absolute rigidity of both dam and foundation, the vertical reaction of the foundation would increase uniformly from zero at the heel to 9.729 tons per square foot at the toe.

44. Now, considering the dam as a bracket or cantilever bearing the reaction as a load, increasing from zero at the heel to 9.729 tons per linear foot at the toe, and neglecting for the time the horizontal shear along the foundation plane—a vertical shear as well as a moment of rupture resulting in tension occurs at vertical planes throughout a considerable distance upstream from the toe. Referring to the diagram below and the nomenclature thereon, the vertical shear along any plane A B situated a distance d upstream from the toe, equals in amount the difference between that part of the total reaction represented by the trapezoid A C D E acting upward and that portion of the weight of the dam represented by triangle A B C acting downward, or

$$Pd \left(1 - \frac{d}{2(T+B)} \right) - .6d^2 \left(\frac{2.4 \times 62.5}{2000} \right) = \text{shear in tons.} \quad \text{Eq. 8.}$$

Or,

$$9.729d \left(1 - \frac{d}{2 \times 184.84} \right) - .045d^2 = \text{shear in tons,}$$

which reduced gives $= 9.729d - .0713d^2 = \text{total shear in tons,}$ and dividing by $\frac{6}{5}d$ gives $\frac{5}{6}(9.729 - .0713d) = \text{shear per square feet in tons.}$

To make shear $= 0$ $d = 136.45$ feet.

Therefore shear per square feet on vertical planes, if uniformly distributed over such planes, diminishes uniformly from 8.11 tons at the toe to zero at 136.45 feet upstream from toe.

45. Regarding now the dam as a cantilever beam, the moment of rupture at section A B situated at a distance d upstream from the toe, is equal to the difference of moments of trapezoid A C D E of reactions, and of mass of triangle A B C of the dam, with respect to a point in line A B.

$$\text{Moment of ACED} = Pd \left(1 - \frac{d}{2(T+B)} \right) \left(\frac{d(3T+3B-d)}{6T+6B-3d} \right)$$

$$\text{Moment of ABC} = .6d^2 \left(\frac{2.4 \times 62.5}{2000} \right) \left(\frac{1}{3}d \right)$$

$$\text{Moment of rupture} = Pd^2 \left(\frac{3(T+B)-d}{6(T+B)} \right) - .015d^3 \quad \text{Eq. 9.}$$

Making $P = 9.73$ tons, and $T+B = 184.84$, say 185.

$$\text{Moment of rupture} = 9.73d^2 \left(\frac{555-d}{1110} \right) - .015d^3 \text{ foot-tons.}$$

To determine moment of resistance of beam at cross-section A B, assume that modulus of elasticity in cyclopean masonry is the same in tension and compression, which will locate the neutral axis at $\frac{1}{2}$ of the depth of the beam above its bottom, or $\frac{1}{2}$ of $\frac{6}{5}d = .6d$ above point A. Now letting t = the tension at the lowest point A, the moment of resistance of the beam on its tension side alone will equal $\int_0^{.6d} \frac{x}{.6d} \times t \times d \times -\frac{1}{3} (.6d)^3 t$ and on the compression side the same, making—

$$\text{Moment of resistance} = .24d^3 t \quad \text{Eq. 10.}$$

Placing this equal to the amount of rupture given above:

$$.24d^3 t = 9.73d^3 \left(\frac{555-d}{1110} \right) - .015d^3$$

$$\begin{aligned} \text{Whence} \quad t &= \frac{1}{.24} \left[9.73 \left(\frac{555-d}{1110} \right) - .015d \right] \\ &= 40.5417 \left(\frac{555-d}{1110} \right) - .0625d \\ &= 20.27 - .099d \text{ very nearly.} \end{aligned}$$

The above is the tension in tons per square feet in "farthest fiber" or at point A. The total tension across joint A B is the sum of the progression diminishing uniformly from the above maximum at A to zero at the neutral axis, which is $\frac{1}{2}$ of A B above A or at $\frac{1}{2}$ of $\frac{6}{5}d = .6d$, making total tension = maximum tension $\times .3d$. It is $\frac{2}{3}$ of this latter amount which must be overcome by horizontal shear along the base between the points A and C, if tension is to be prevented.

46. The above formulæ give for assigned values of d , vertical shear, maximum tensions, total tensions, etc., as follows:

d feet.	Vertical shear per square foot.	Maximum tension tons per square foot.	Total tension tons.	Equivalent tension concentrated at A.	Total shear in front of A.
0	8.11	20.27	0.00	0.00	0.00
1	8.05	20.17	6.05	4.03	4.08
10	7.52	19.28	57.84	38.56	40.80
20	6.92	18.29	109.74	73.16	81.60
30	6.33	17.30	155.70	103.80	122.40
40	5.74	16.31	195.72	130.48	163.20
50	5.14	15.32	229.80	153.20	204.00
60	4.55	14.33	257.94	171.96	244.80
70	3.95	13.34	280.14	186.76	285.60
80	3.36	12.35	296.40	197.60	326.40
90	2.76	11.36	306.72	204.48	367.20
100	2.17	10.37	311.10	207.40	408.00
136.45	.00	6.76	276.72	184.48	556.70

47. Now the total horizontal shear along the base is the water pressure against the upstream face of the dam, which is

$$\frac{1}{2}H(H+2h) \times \frac{62\frac{1}{2}}{2000} = \frac{1}{2} 210 (230) \frac{62\frac{1}{2}}{2000} = 754.69 \text{ tons.}$$

If this were uniformly distributed over the base it would amount to $754.69 \div 185 = 4.08$ tons per foot, which is entered in the last column of the table above. Comparison of the last two columns indicates that, under the above assumption of uniform distribution of horizontal shear, no tension would exist at lower edge of any vertical longitudinal section. But to guard against the possibility of tension to result, should the horizontal shear toward the toe fall short of a uniform distribution, as well as to reduce the larger vertical shears shown in column two, some thickening is desirable at the toe, which would be fully furnished by the reversed curve required for overfall, as indicated on the diagram on page 8, by making that curve begin as much as 35 or 40 feet back from the toe.

48. The distribution of horizontal shear at base of dam, though assumed in the above calculation to be uniform, is not necessarily so. Different authors have assumed various laws of distribution—parabolic, rectangular, trapezoidal, triangular, and compounds of parabolic and triangular. But in reality the distribution at the base of any given dam is dependent upon special conditions obtaining at that base, such as relative compressibility of masonry and foundation; presence or absence of friction; presence or absence of adhesion; and presence and location of anchorages. For example: (A) If the masonry and foundation rock were both nonyielding, and if their junction were a horizontal plane with only friction to prevent sliding, then with resultant intersecting at the downstream one-third point, making the normal pressures between dam and foundation increase uniformly from zero at the heel to twice the mean at the toe, the friction, which opposes the horizontal shear, being proportional to load or pressure, would likewise increase uniformly from zero at the heel to twice the average shear at the toe. The same would still be true if there be vertical yielding in either dam or foundation, or both, provided this yielding or compression be proportional to the load, and provided further that it be limited to only the vertical direction, leaving the dam still rigid as a cantilever beam. But in fact the masonry is compressible horizontally also, whereby the toe of the dam bends up, relieving itself of a portion of the vertical reaction it would otherwise need to withstand, but at the expense of somewhat increasing the normal pressures at and near the downstream one-third point. Thus, just as the diagram of vertical pressures may depart from the triangular form, so also would vary the diagram of active friction as an opponent of sliding. (B) If sliding be prevented, not by friction, but by adhesion, as of mortar between dam and foundation, or else by a large number of equal and equidistant notches constituting anchorages, then in either case the distribution of horizontal shear will be dependent on relative compressibilities of masonry and foundation rock. If both be equally compressible in the downstream direction, as in certain models in which dam and foundation were made of one piece of yielding material, the shear

would be distributed uniformly. The same would be true if both were absolutely noncompressible or unyielding. If the material of the dam were compressible and that of the base noncompressible, then the shear would be a maximum at the heel, diminishing uniformly toward the toe, making its diagram a trapezoid; and an inclined fracture due to tension would be likely to occur near the heel. But if the foundation be compressible and the dam noncompressible, the shear would increase uniformly from heel to toe, making its diagram a trapezoid with its wider end downstream. (C) If there be a single large anchorage at or near the heel, as is often employed for the additional purpose of intercepting water, then the shear would be largely concentrated at that point, a condition tending strongly to oblique rupture near the heel. But if the single large anchorage be at the toe instead, without the intercepting wall, if any, at the heel, being an integral part of the dam, the resulting partial concentration of shear at the toe, if not in excess of the shearing strength, will be beneficial in insuring against tension, which, in the absence of horizontal shear at and near the toe, must exist across the lower parts of vertical planes in that vicinity.

49. In the proposed San Carlos Dam on stratified rock dipping some 30° downstream, its junction with the foundation would naturally be in a succession of steps or notches throughout the distance from heel to toe, a condition which, if taken alone, is, as stated above, conducive to a uniform distribution of horizontal shear. The foundation rock, however, being of varying degrees of hardness from that of a grindstone to hard quartzite, though containing many incipient seams in various directions is, as a whole, less compressible than ordinary dam concrete, which, as also stated above, would tend toward making the shear next the base decrease somewhat from heel to toe. But it is known that concrete curing under constant moisture, as would be the case at the bottom of the dam, is inclined to expand a little, which, on account of the confinement due to the interlocking with the steps in the foundation, would result in an initial compressive stress in the concrete, making it bear hardest against the downstream faces of notches near the toe and the upstream faces of notches near the heel, which in turn would result in transmitting a greater proportion of the horizontal pressure of water to be borne by the more distant notches, making the shear greater toward the toe; and this may offset the reverse effect of the greater rigidity of bedrock and leave the shear not greater at the heel than at the toe. In any event it is possible in construction to preordain a greater shear toward the toe by providing that the principal anchorages shall be in that vicinity, and to that end the natural notches in the bedrock at and near the heel would be obliterated by filling them with concrete, which, together with top of intercepting wall, if any, would be first finished either level or with slight downstream slopes. Such procedure would insure against the oblique fracture at the heel and would provide near the toe sufficient shearing tendency to prevent any tension across vertical planes, for, as shown on page 14, not more than the average of the shear throughout the base is required for such purpose.

50. In theory, analysis and calculation can be carried to greater refinement, but the physical data do not warrant it. Some parts of the foundation may be more yielding than others, rendering even

our assumed distribution of vertical reactions only a rough approximation. And compressibility, on which depend in a measure several theoretical calculations, is very likely not uniform as assumed, either in the cyclopean masonry or in the bedrock. Moreover there can be internal strains from setting of concrete and from differences of temperature which, being unknown, would defeat any attempt at precision in some of the calculations which a paper diagram might inspire one to undertake.

51. From the calculations herein made and from comparison with existing dams it is certain that under the conditions of water pressure and upthrust imposed the dam as proposed, if built without anchorage at its heel but at the toe, would be safe in every way, barring possible destructive effect of earthquake.

52. The cubical contents of a few of the various dams considered are in the following table:

Cubic yards of masonry in dams of various heights at upper site.

[Spillway weir not included.]

No.	Total height of dam above datum. ¹	Height of spillway above datum. ¹	Above datum.			Below datum.			Grand total.
			To present rock surface.	Projection of 3 feet vertically into rock.	Total.	To present bedrock.	Projection of 3 feet into bedrock.	Total.	
1.....	190	180	234,712	4,660	238,781	18,502	4,062	22,564	261,345
2.....	206	190	256,548	6,224	262,772	18,556	4,145	22,701	285,473
3.....	160	150	151,129	3,030	154,159	15,689	3,395	19,084	173,243
4.....	135	125	104,026	2,124	106,149	13,335	2,885	16,220	122,369

¹ The datum is the stream bed at lower site.

No. 1 is that shown on map No. 4, tangent to line G.

Nos. 2, 3, and 4 are tangent to line H, and the common center of their curves is 20 feet east and 75 feet south (magnetic) from that of No. 1.

D. E. HUGHES.

31679°—H. Doc. 791, 63-2—7

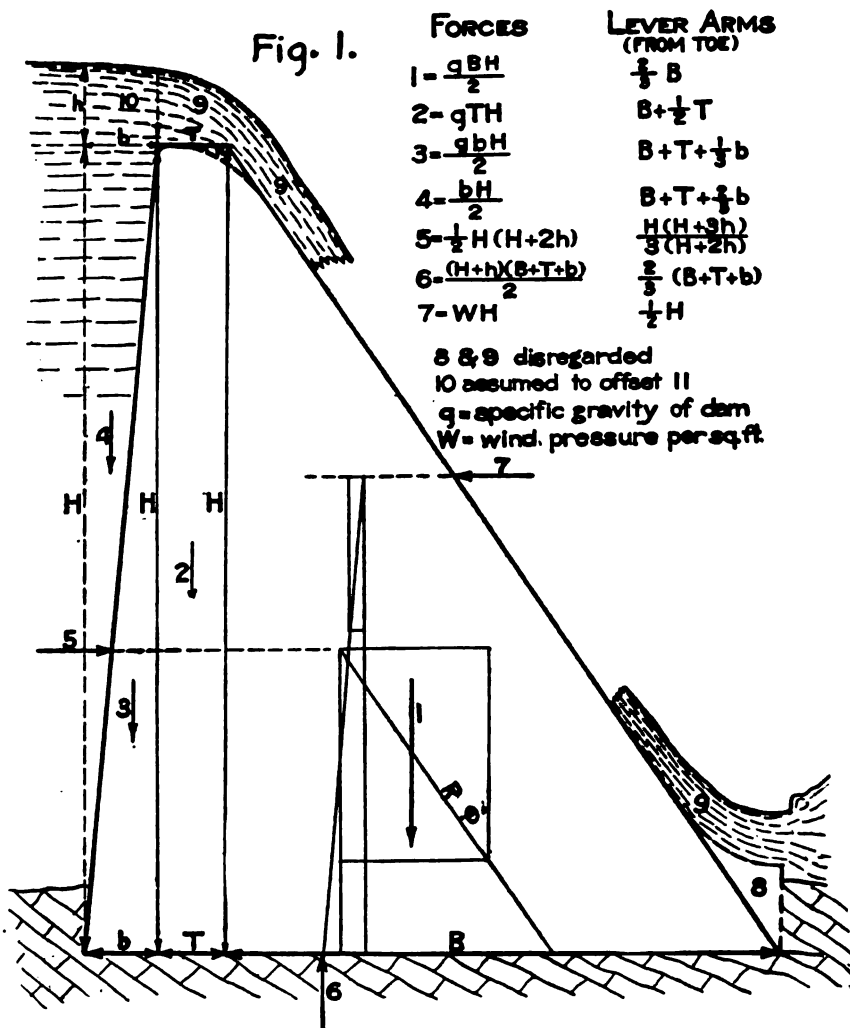


Fig. 2.

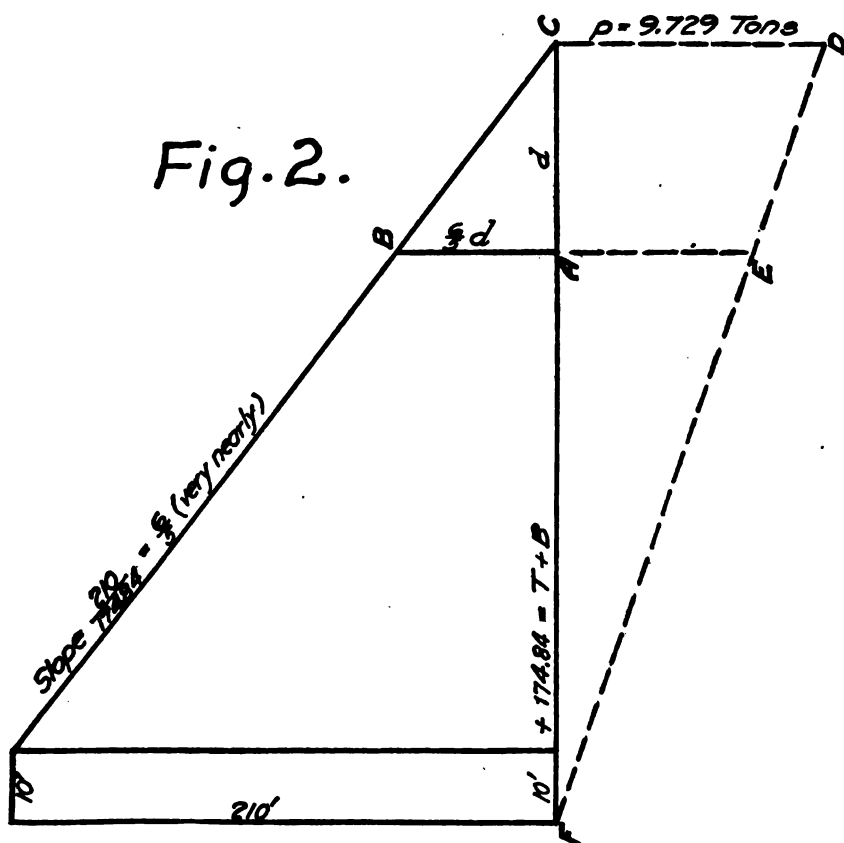
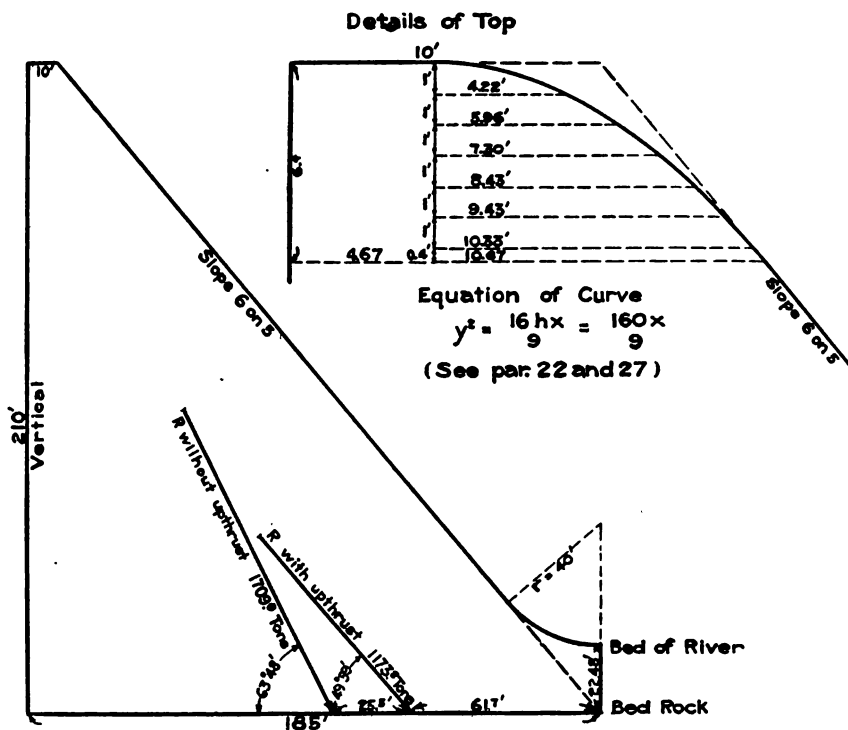


Fig. 3.

MAXIMUM CROSS-SECTION OF PROPOSED DAM



Max. Compression at toe 12.71 tons per sq. ft. (par. 36 & 38)

Max. Compression at heel 15.73 tons per sq. ft. (par. 39)

APPENDIX E.

EVAPORATION.

1. In Water Supply Paper No. 33 a yearly depth of evaporation of 91 inches from the reservoir is assumed. While this figure may not be excessive for small bodies of water in southern Arizona—canals, for example—the results of the Salton Sea investigations and other data that have become available since Water Supply Paper No. 33 was published indicate that 60 inches is more nearly correct for a reservoir at San Carlos. It has not been attempted to make use of any of the evaporation formulas lately proposed (discussed in the "Weather Review" and other publications), partly because their correctness has not been conclusively shown, and largely because accurate values for the terms entering them are not known and could only be obtained as the result of long-continued observations at the reservoir site. Measured evaporation at nearby or similar places has been considered, and such corrections applied thereto as seemed proper.

2. In the Monthly Weather Review for 1910 we find for the year June 1, 1909–June 1, 1910—

	Inches.
Actual fall of Salton Sea level.....	51.00
Inflow through New and Alamo Rivers.....	12.00
Accumulated from annual precipitation.....	6.00
Total amount due to evaporation.....	69.00

3. In the following letter it is stated that the evaporation from the Salton Sea amounts to 72 inches, and that it may be inferred that the evaporation from the San Carlos reservoir would be about 56 inches:

UNITED STATES DEPARTMENT OF AGRICULTURE,
WEATHER BUREAU, OFFICE OF THE CHIEF,
Washington, D. C., October 18, 1910.

Mr. DUANE E. FOX,
Washington, D. C.

DEAR SIR: I have asked Dr. W. J. Humphreys, professor of meteorological physics, to prepare a reply to your letter of October 15, asking for information in regard to probable rate of evaporation at San Carlos, Ariz. His reply is as follows:

"The rate of evaporation depends upon area of surface, relative humidity, temperature of water and of air, wind velocity, barometric pressure, and other less important conditions. Evidently then the rate of evaporation found at one place under a particular set of conditions is not sufficient data for determining the exact rate of evaporation at either the same or any other place under a different set of conditions. The conditions themselves change too rapidly and too irregularly to permit of exact measurement of their individual effects.

"It has been found, however, by Prof. F. H. Bigelow that the evaporation of the Salton Sea, Cal., is roughly proportional to the excess of its average surface temperature above the freezing point.

"Now, the general conditions, except temperature and the comparatively unimportant one of barometric pressure, at San Carlos, Ariz., are somewhat similar to those of the Salton Sea. We may, then, on the basis of Prof. Bigelow's work assume that

the rates of evaporation at the two places, Salton Sea, Cal., and San Carlos, Ariz., are to each other as the excesses above freezing of the temperatures of their respective water surfaces.

"But the average air temperature at Salton Sea is about 74° F. and at San Carlos 64° F., and hence the average of the water surface temperatures in the neighborhood of 68° F. and 60° F., respectively, above freezing.

"Hence we get the proportion: The yearly evaporation at Salton Sea, 72 inches, is to the yearly evaporation at San Carlos as 36 is to 28; that is, the yearly evaporation at San Carlos on the above assumption is in the neighborhood of 56 inches."

Very respectfully,

WILLIS L. MOORE,

Chief, United States Weather Bureau.

4. The rainfall at San Carlos averages 13 inches. If the evaporating influences are the same at San Carlos and at Salton Sea, then the evaporation from the San Carlos reservoir would be 69 inches (or 72) less 13 inches, equal 56 inches (or 59). Thirteen inches of rainfall is deducted from the total evaporation notwithstanding that the rain falling upon a portion of the reservoir is already figured in the water supply itself, since between the dam and the points where run-off determinations were made there is a drainage area tributary to the reservoir which can be counted on to supply enough water to offset the rainfall on the portion of the reservoir referred to.

5. As regards the difference in elevation between the Salton Sea and the San Carlos reservoir, we may quote Prof. Bigelow (see also Prof. Humphreys in the letter quoted above) to the effect that "there is no evidence that the water in pans of the same size evaporates faster on the plateau levels, 4,000 feet, than at sea level."

6. In report of Advisory Board of Army Engineers on Water Supply for San Francisco, page 80, it is stated that—

Records of the United States Geological Survey show that at Kingsburg, on Kings River, during a four-year period (1881-1885) it (evaporation) varied from 2.69 feet to 4.68 feet, the mean being 3.85 feet. At Sweetwater Reservoir, during a period of 10 years (1889-1899), it varied from 3.75 to 5.17 feet. From a tank at Reno, Nev., in 1894, it is given as 3.35 feet. The mean for Clear Lake, Lake County, is given as 32 inches. Mr. Schussler, of Spring Valley Water Co., states that several years' observation at Crystal Springs Reservoir showed evaporation at the rate of one-fourth inch per day for 200 days in the year, or 50 inches per year. For a region with fog so prevalent as is the (San Francisco) peninsula, this rate of evaporation, as compared with those from the other places mentioned above, seems abnormally high. However, it has been given weight in accepting 4 feet as the average annual depth of evaporation from surfaces of Sierra and Coast Range reservoirs. * * *

7. As to pan observations, Prof. Bigelow states:

The purpose of studying evaporation from pans has been to develop formulas and tables applicable to water surfaces without using any pan, because of the insuperable difficulties of making accurate transfers from pan to lake, on account of the very complex nature of the pan action, which has now been fully explained and illustrated. The temperature of the water, the vapor pressure, and the wind are all very different at the lake from what they are at the pan, and there is no reliable way known to go from one to the other. There can be no more erroneous procedure than to assume that the evaporation of a pan at some distance from a large water surface is equal to that at the lake. In dry climates the large water surface evaporates from one-third to two-thirds the rate of a 1 square meter pan. (Bulletin of the Argentine Meteorological Office, Walter G. Davis, director, March, 1911.)

He also states that "water evaporates much faster from small pans than from large pans," and that "the evaporation from a 4-foot standard pan, when corrected for temperature and wind, and multiplied by the factor 66 per cent, is about what observation suggests" for near-by water surfaces. (Monthly Weather Review, 1910.) From the Salton Sea experiments it would appear that this factor, 0.66, is

correct only when applied to evaporation measured in 4-foot pans placed immediately above the water surface of the lake or reservoir, and is too large for evaporation measured in pans on the land.

8. The great differences in evaporation measured at the same place under different circumstances are well illustrated by the following figures taken from the Monthly Weather Review for 1910:

	Inches.
(a) Evaporation from a pan 2 feet in diameter on the ground, 1,500 feet inland from the shore of the Salton Sea.....	164.50
(b) Same, except pan 40 feet above ground (on tower).....	193.44
(c) Evaporation from a 4-foot pan, 2 feet above water surface, on tower 500 feet off-shore in Salton Sea.....	108.65
(d) Same, except pan 45 feet above water surface (on tower).....	137.71
(e) Tower, 7,500 feet off shore in Salton Sea; pan 4 feet in diameter, 2 feet above water surface.....	106.45
(f) Same, pan 45 feet above water surface.....	140.02
(g) Evaporation from a 2-foot pan on ground at Granite Reef Dam, Arizona....	115.18
(h) Same, 3-foot pan, elevated 10 feet above ground.....	136.84
(i) Same, 4-foot pan, floating.....	97.74

Many additional observations could be quoted to show the effect of elevating the pan 10 feet or more. While this throws no light on the probable evaporation from a reservoir at San Carlos, it indicates that pan evaporation, when the circumstances surrounding the observations are not stated, may be misleading. For example, the figures given in (a) and (b) above, viz., 164.5 and 193.44 inches, considered alone would lead one to believe that the evaporation from the Salton Sea must be greater than the measured value, 69 (or 72) inches. There is close accord between (c) and (e), and (d) and (f), respectively. The factor 0.66 applied to (c) or (e) gives about 70.1, which is very close to the determined evaporation. If we assume that the evaporation from the Salt River at the Granite Reef Dam is the same as the evaporation from the Roosevelt Reservoir, then it appears from (i) that evaporation from a floating pan is considerably greater than from the water in which the pan is floating. The pan evaporation would depend, among other things, on the depth of water in the pan, but it is likely that on account of difference in depth of the river and reservoir, motion of the river, etc., the evaporation from the river at Granite Reef Dam is greater than from the reservoir. These considerations may account in some measure for the discrepancy between the figure given in (i), viz, 97.74, and the accepted depth of evaporation from the reservoir, viz, 53.03. It may be noted that $97.74 \times 0.66 = 63.9$.

9. In the following letter it is stated that (pan) evaporation near El Paso amounts to 84.84 inches:

UNITED STATES GEOLOGICAL SURVEY,
Washington, D. C., November 14, 1911.

To Mr. M. O. LEIGHTON,
Chief Hydrographer, United States Geological Survey,
Washington, D. C.

In connection with the discussions concerning the San Carlos Reservoir, there has been some difference of opinion regarding evaporation, and you may be interested in the following figures compiled by H. J. Gault, engineer, showing the results of experiments on evaporation carried on by the United States Reclamation Service in connection with Prof. Bigelow, of the Weather Bureau.

Month.	Evaporation.	
	Per cent.	Feet.
January.....	2.4	0.17
February.....	2.4	.17
March.....	8.2	.58
April.....	8.6	.61
May.....	12.7	.90
June.....	13.3	.94
July.....	11.5	.80
August.....	13.5	.95
September.....	10.9	.77
October.....	7.9	.56
November.....	5.4	.38
December.....	3.4	.24
Year.....	100.0	7.07

¹ Equals 84.84 inches.

These observations were carried on on the Rio Grande where the altitude is higher and the climate not near so warm or so arid. The evaporation in the Rio Grande Valley should be less than that at San Carlos.

A. P. DAVIS,
Chief Engineer.

This presumably is the total evaporation; i. e., including rainfall. If we apply the factor 0.66 and subtract the rainfall at San Carlos, we have for evaporation from the San Carlos reservoir, $84.84 \times 0.66 - 13 = 43$ inches.

10. The results given below were obtained by Prof. R. H. Forbes from investigations carried out under his direction at the University of Arizona, Tucson:

Year.	Total evapo- ration.	Months.	Mean for each month for the years 1891-1902.	Percent- age of total.
	<i>Inche.</i>		<i>Inches.</i>	
1891.....		January.....	2.94	3.4
1892.....	79.48	February.....	3.72	4.3
1893.....	74.11	March.....	5.98	6.9
1894.....	79.48	April.....	8.18	9.4
1895.....	90.76	May.....	10.32	11.9
1896.....	84.15	June.....	12.00	13.8
1897.....		July.....	11.01	12.7
1898.....	92.70	August.....	9.29	10.7
1899.....	88.36	September.....	8.47	9.8
1900.....	97.04	October.....	7.01	8.1
1901.....	85.19	November.....	4.34	5.0
1902.....	93.86	December.....	3.45	4.0
Total.....	865.13			
Mean.....	86.51			

Prof. Forbes states that this figure, 85.51, includes rainfall. If we assume the evaporation at San Carlos to be the same as at Tucson, apply the factor 0.66 and subtract the San Carlos rainfall we have for evaporation from the San Carlos reservoir, $86.51 \times 0.66 - 13 = 44$ inches.

11. The consulting engineers, J. D. Schuyler and H. Hawgood, in their report of September 27, 1910, to Chas. R. Sligh, say in regard

to the adoption by Mr. Leighton in his report of February 8, 1910, of Lippincott's figure (91 inches):

Further, the provision for evaporation of 91 inches per annum, founded on experiments made some 20 years ago, is excessive, and not supported by the more recent and searching investigations made by the United States Weather Bureau at Reno and at Salton Sea, and if the Department of Agriculture on the slopes of Mount Whitney, Cal., which clearly indicate that the probable evaporation from a reservoir surface of the elevation and location of San Carlos would be in the neighborhood of 66 and not 91 inches.

12. Evaporation at the Roosevelt Reservoir is estimated by Prof. R. H. Forbes to be as in the following table:

	Average of rainfall at McDowell and Tonto.	Evapora- tion at sta- tion farm Phoenix.	Net loss.
January.....	1.56	1.76	0.2
February.....	1.40	2.61	1.2
March.....	1.29	3.99	2.7
April.....	.54	5.74	5.2
May.....	.30	8.28	7.9
June.....	.16	9.42	9.3
July.....	1.20	11.29	10.1
August.....	1.82	6.55	4.7
September.....	1.15	7.08	5.9
October.....	.53	4.81	4.3
November.....	1.20	2.05	.9
December.....	1.45	2.05	.6
	12.60	65.63	53.03

The measured evaporation at the Station Farm includes rainfall. The circumstances surrounding these observations are thought to be such as to make the measured evaporation approximate that from an open water surface.

13. Lippincott, in Water Supply Paper No. 33, assumed the depth of evaporation from the proposed San Carlos Reservoir to be as in the following table:

	Inches.		Inches.
January.....	3t	August.....	13
February.....	4t	September.....	10
March.....	6t	October.....	6
April.....	7t	November.....	5
May.....	10t	December.....	4
June.....	11t		
July.....	12t	Total.....	91

Applying the factor 0.66, we have 60.1 inches.

14. Pan evaporation at Independence, Cal., under desert conditions, is reported to be 5.467 feet, as result of partial observations taken in 1908 and 1911, and observations extending through the years 1909-10. (Water Supply Paper 294, p. 118.)

15. In 1912 observations of variations in the level of Owens Lake, Cal., measurement of inflow, including rainfall, showed that the depth of evaporation was 4.61 feet. The water of this lake is heavily alkaline.

16. Collecting the above figures, we have:

Salton Sea.....	¹ 69.00
San Carlos Reservoir (from Salton Sea, Chief of Weather Bureau).....	56.00
By allowing for difference in rainfall.....	² 56.00

¹ Or 72.

² Or 59.

Rio Grande, pan evaporation (Davis).....	84.84
San Carlos Reservoir, from Rio Grande, applying factor 0.66 and difference in rainfall.....	43.00
Tucson, pan evaporation (Forbes).....	86.51
San Carlos Reservoir, from Tucson, applying factor 0.66 and difference in rainfall.....	44.00
San Carlos Reservoir (Schuyler & Hawgood).....	66.00
Roosevelt (Forbes).....	53.00
San Carlos (Lippincott).....	91.00
San Carlos Reservoir, from above, applying factor 0.66.....	60.1
Independence, pan evaporation.....	65.60
Owens Lake.....	55.32

17. From the above, it seems justifiable to assume net evaporation from the San Carlos Reservoir at 60 inches, or a gross evaporation of 73 inches.

18. The following table shows the monthly percentages of the total annual evaporation as deduced in the Tucson and Rio Grande experiments and as used by Lippincott in Water Supply Paper No. 33, respectively:

Months.	Tucson.	Rio Grande.	Water Supply Paper No. 33.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
January.....	3.4	2.4	3.3
February.....	4.3	2.4	4.4
March.....	6.9	8.2	6.6
April.....	9.4	8.6	7.6
May.....	11.9	12.7	10.9
June.....	13.8	13.3	12.0
July.....	12.7	11.3	13.2
August.....	10.7	12.5	14.2
September.....	9.8	10.9	10.9
October.....	8.1	7.9	6.6
November.....	5.0	5.4	5.5
December.....	4.0	3.4	4.4

19. The Tucson percentages will be assumed for the San Carlos Reservoir.

Net monthly evaporation from San Carlos Reservoir.

Months.	Gross average monthly evaporation. ¹	Average rainfall for each month. ²	Net loss per month.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
January.....	2.43	1.36	1.12
February.....	3.14	1.49	1.65
March.....	5.04	1.15	3.89
April.....	6.86	.39	6.47
May.....	8.60	.26	8.34
June.....	10.08	.16	9.92
July.....	9.27	1.64	7.63
August.....	7.81	2.55	5.26
September.....	7.15	.90	6.16
October.....	5.91	.80	5.02
November.....	3.65	.84	2.81
December.....	2.92	1.28	1.64
Total.....	73.00	13.00	60.00

¹ As per Tucson percentages.

² Determined from Weather Bureau rainfall records at San Carlos extending over 31 years.

C. H. MCKINSTRY.

APPENDIX F.

RUN-OFF OF GILA RIVER AT SAN CARLOS, ARIZ.

1. The run-off information available to the board is that published in the Water Supply Papers of the Geological Survey; that furnished by the Chief Hydrographer of the Geological Survey, as the result of a recomputation made in January, 1913, of the data from observations taken at San Carlos in 1899, 1900, 1901, 1902, 1903, 1904, and 1905; and that furnished for the years 1910, 1911, and 1912 by the San Francisco office of the Geological Survey. Specific references to the Water Supply Papers will be found in the following discussion.

2. Prior to July, 1899, the flow of the Gila River, as recorded on pages 25 to 30 of Water Supply Paper No. 33, was determined at the Buttes below the mouth of the San Pedro River for the seasonal year from September 1, 1889, to September 1, 1890; the fractional year from August 1, 1895, to December 31, 1895; the full year 1896; the fractional year from January 1, 1897, to October 3, 1897; the year 1898; and the fractional year from January 1, 1899, to June 30, 1899.

3. It has been generally believed that the volume of water passing San Carlos is 90 per cent of that passing the Buttes. The reasons for this assumption are discussed on pages 22 and 23 of Water Supply Paper No. 33, where it is stated that for the period May to August, 1890, 207,936 acre-feet passed the Buttes, of which only 19,488 acre-feet, or 9.4 per cent, was contributed by the San Pedro; and that the synchronous observations at the Buttes and San Carlos extending from July 19 to September 23, 1899, indicated that during that period 74 per cent of the water passing the Buttes was available at San Carlos. It is now possible to extend the latter comparison to cover a somewhat longer period, for revised data furnished in blue-print sheets to the board in 1913 by the Chief Hydrographer of the United States Geological Survey, give San Carlos discharge from July 11 to September 30, 1899, to be $36,896 + 12,654 + 12,487 + 82 =$ mean flow of 757 second-feet; while Water Supply Paper No. 33, page 27, gives for the Buttes between the same dates $36,830 + 20,835 + 21,996 + 82 =$ mean flow of 971 second-feet, San Carlos here being $757 \div 971 = 78$ per cent of the Buttes. Were September excluded the percentage would be 86. Regarding the comparison for August, it is explained on page 22 of Water Supply Paper No. 33 that though the rainfall over the State for that month was very deficient, the precipitation in the headwaters of the San Pedro was abnormally large, thus indicating that the above 86 per cent, which included August, is below the normal ratio.

4. Now, in 1913, still further comparisons are possible, for there have been made available for the use of the board, provisional readings for the years 1911 and 1912 at Kelvin, Guthrie, and Clifton,

indicating discharges for the two years, of 876,911 acre-feet at Kelvin as against 690,670 acre-feet for Guthrie and Clifton combined, the latter being about 21 per cent the smaller. Considering the intermediate position of San Carlos, with the San Simon and San Carlos Rivers above and the San Pedro River below, its water supply would have the intermediate value of about 10 per cent less than that at Kelvin or at the Buttes.

5. The factor 90 per cent for reducing Buttes determinations to San Carlos is therefore accepted with increased confidence, and is applied to the determinations at The Buttes as recorded on pages 28-30 of Water Supply Paper No. 33 for last four months of 1889; first 8 months of 1890; last 5 months of 1895; all 12 months of 1896; first 9 months of 1897; all 12 months of 1898; and first 6 months of 1899.

The next 3 months of 1899, namely, July, August, and September, are taken from San Carlos measurements as given on blue-print record sheets thereof.

6. It may be noted that the 73,300 acre-feet entered for July, 1899, was for only the last 21 days of the month, but Water Supply Paper No. 33, on page 27, indicates that at The Buttes the river was practically dry during the first 10 days of the month.

7. The missing months in the above record, as well as in subsequent years, entered in parentheses in the table found at the end of this appendix, are not copied from any record, but are supplied from the rainfall for such months at the 14 stations distributed over the watershed above San Carlos; using the proportion, that as the average rainfall for a given month for a long period of years is to the rainfall in the same month of the year under consideration, so is the mean water supply of that month for all the years in which it has been determined, to the probable supply of that missing month. In some instances the results of the proportion were somewhat increased or decreased, dependent on whether the preceding month was wetter or drier than common, for the known figures, as well as reason, indicate that the preceding month has its influence.

8. The last 9 months of 1900 and the 12 months of 1901 are taken from the revised blue-print record sheets furnished the board in 1913.

9. For the year 1902 the figures given in Water Supply Paper No. 85, on page 35, are used instead of those given on the later blue prints, for the latter show themselves too small whether comparison is made with the rainfall or with the Roosevelt Reservoir supply for that year. Even the figures used from Paper 85 are probably somewhat too small; and they seem to have been so regarded in that paper, for in long series of dates without gauge heights it was not recorded that the river was dry but that there was no water at the gage, and the measured flows were not totaled to give the year's supply as they are elsewhere when the monthly records are complete. That "no water at the gauge" did not necessarily mean no flow in the river is indicated on blue-print record of July 2, 1905, where under like conditions of "dry at the gauge" there was a flow some distance away which was estimated to be 40 cubic feet per second.

10. It may be noted that the principal cause of the difference between the earlier record in Water Supply Paper No. 85 and the present revised one on the blue-print sheet, results from having changed a discharge measurement, taken August 26, after three days of flood, while the gauge still read 3.4 feet, from 3,118 acre-feet to 1,350 acre-

feet, which change had a marked effect on the rating curve for that part of the year. Later in the year, December 14, as much as 2,414 acre-feet was used in the revised blue-print record as corresponding to the same gauge height of 3.4 feet.

11. It is stated in one or more of the water-supply papers that the gaugings at San Carlos are subject to inaccuracies on account of width and shallowness and shifting of stream. It is also stated that the bed where the river was gauged is shifting quicksand. It is known that such river bed may be much lowered temporarily while a flood is passing. All of which makes the first used figure of 3,118, though apparently out of harmony with its neighbors, as trustworthy as the latter substituted lower value of 1,350. Furthermore, a like rise in 1913 was estimated to flow at least 3,000 second-feet.

12. All of the year 1903 and all of 1904 are taken from the revised blue-print record sheets furnished the board in 1913.

13. In the great flood year of 1905 the San Carlos gauge was destroyed two or more times, with the result that none of the big floods were recorded there. But gaugings were made the same year on the upper Gila at Cliff, and on its tributary, the San Francisco, at Alma.

14. Selecting so much of the year's records as are common to the three stations, namely: From May 22 to November 26, 1905, as given for San Carlos on the blue-print sheet furnished the board in 1913, and for Cliff and Alma in Water Supply Paper No. 175 on pages 161-162 and 169-170, respectively, the following comparative table results:

1905.	San Carlos.	Cliff.	Alma.	Cliff plus Alma.
May 22-31.....	14,200	10,230	2,010	12,240
June.....	15,200	16,180	1,297	17,477
July.....	6,120	8,178	1,463	9,641
August.....	27,100	11,190	3,486	14,676
September.....	32,400	11,420	10,120	21,540
October.....	9,160	9,162	2,804	11,966
November 1-26.....	46,890	14,040	10,520	24,560
Total.....	151,070	80,400	31,700	112,100

15. Here the Cliff total is $2\frac{1}{2}$ times that of Alma; and the San Carlos total is a third greater than the sum of Cliff and Alma. It will be observed in the table that in times of low water San Carlos shows loss, due probably to irrigation and evaporation above; but that in higher stages of the river, which can not yet be called floods, the excess at San Carlos is more than one-third part. It is noteworthy that during the period tabulated above nothing that can be called a large flood occurred at any of the three stations—the greatest flow at San Carlos being 3,240, at Cliff 985, and at Alma 1,575 second-feet. The above period stopped on the eve of a real flood, which reached 13,640 second-feet at Cliff on November 27, and was not measured at Alma, and which destroyed the San Carlos gauge on November 28. Between San Carlos below and Cliff and Alma above, there is a large area drained in to the Gila by the San Simon River and numerous washes, and by the San Carlos River, which is an important tributary. The above considerations alone would seem to warrant increasing the combined discharge at Cliff and Alma

as much as 33 per cent to give corresponding discharge at San Carlos. The comparison for 1911 and 1912 between Kelvin, Guthrie, and Clifton, as given in paragraph 4 of this paper, indicates that an increase of 10 per cent or a little more, should be applied to Guthrie and Clifton to represent San Carlos, and it would be expected that a considerable larger increase would need to be applied to Cliff and Alma, which are farther up the rivers. Such expectation is verified to a degree by synchronous readings at Alma and Clifton in 1910, hereinafter given in paragraph 26.

16. In view of all the above it seems certain that the Cliff and Alma discharges should be increased as much as 20 per cent, and very probably considerably more, to give the water supply at San Carlos. Hence 20 per cent increase is herein used for 1905, 1906, 1907, and 1909, with every confidence that the results will be conservative.

17. Proceeding now to greater detail. Water Supply Paper No. 175, on pages 169 and 170, gives for Alma 263,309 acre-feet discharge for 1905, excluding the time from November 26 to December 3, during which a large flood occurred as stated on page 3 of this paper. The same Water Supply Paper, No. 175, on pages 161-2, gives for Cliff 190,090 acre-feet for the period extending only from May 22 to the close of the year. But the comparisons shown in table on page 3 of this paper indicate that the flow at Cliff may be $2\frac{1}{2}$ times that at Alma; and a still better comparison is furnished by the following year, 1906, for which the records are complete as given in Water Supply Paper No. 211, giving on page 128 Alma discharge of 111,812 acre-feet, and on page 123 Cliff discharge of 243,760 acre-feet, which is $2\frac{1}{2}$ times as large.

18. Accepting the smaller of the two factors, namely, $2\frac{1}{2}$ instead of $2\frac{1}{2}$, the missing months of Cliff, 1905, record are so supplied as to make Cliff's total for the year two and one-fifth times Alma's total, or 579,280 acre-feet. This result is obtained by making Cliff: January, 30,000; February, 75,000; March, 140,000; April, 125,000; and May, 29,410. It should be remarked in passing that these monthly amounts, though bringing the year up to two and one-fifth times Alma, fall considerably short of being two and one-fifth times the corresponding monthly amounts of Alma, being in fact only about one and three-fourths times as much. But it is more conservative to apply the ratio of $2\frac{1}{2}$ to the year rather than to obtain a larger amount by applying it to the missing months only.

19. The results now are as follows:

Alma, excluding flood between Nov. 26 and Dec. 3.....	263, 309
Cliff, with four and a fraction months supplied.....	579, 280
Total.....	842, 589
Increase, 20 per cent.....	168, 518
Estimate for San Carlos for 1905.....	1, 011, 107

20. The flood, excluded above, not measured at Alma, amounted to 79,868 acre-feet at Cliff. Were this divided by $2\frac{1}{2}$ to give estimate of same flood at Alma and this increased 20 per cent, the 1,011,107 adopted for San Carlos would have been 43,560 higher. But to apply a ratio to a time so short—only six days—in which a flood can be on one branch of a river and not on the other, would not be justified, especially when conservatism is the guide.

21. For 1906 the records are, as stated above, complete for both Cliff and Alma, as given in Water-Supply Paper No. 211, on pages 123 and 128, and since there are no better data for San Carlos, or in fact any at all, the totals of these two stations are simply increased 20 per cent.

22. For 1907 Water-Supply Paper No. 249 gives on page 180 a discharge for Alma of 147,000 acre-feet, excluding the last 12 days of January. Supplying this omission by using the discharge measurements of January 22 and January 24, as given on page 178, and using gauge heights for January 27 to January 31, given on page 179, and interpolating for January 20, 21, 23, 25, and 26, the January flow and the total are each increased 15,900 acre-feet, making the latter 162,900 acre-feet.

23. The 1907 discharge for Cliff is not computed in the record at hand, but on page 176 are gauge readings for the whole year and a few discharge measurements. Using these measurements for a rating curve and the rating of the preceding year for the higher gauge heights and from them computing the discharge for each fifth day in every month, or 72 in the year, there results a mean discharge of 512 second-feet, which is about 50 per cent greater than the 337 second-feet of the preceding year; and the monthly discharges in round numbers become 116,000, 56,000, 38,000, 27,000, 13,000, 9,000, 8,000, 27,000, 35,000, 11,000, 17,000, and 10,000 acre-feet, or 367,000 acre-feet for the year. The ratio of this total to Alma's total, namely, $367,000 \div 162,900 = 2\frac{1}{2}$, compares well with the ratios of $2\frac{1}{2}$ for the fractional year 1905 and the $2\frac{1}{2}$ for the whole of 1906, all as given on pages 3 and 4 of this paper. Hence the results are accepted with confidence and increased 20 per cent to give the flow at San Carlos.

24. During 1908 there were not sufficient gagings anywhere that would indicate the probable flow at San Carlos, the only known gaging being at Redrock from November 16 to December 31; but it being desirable to have figures to show the most probable water supply and to complete certain diagrams, they are supplied from the known rainfall over the drainage area, using the proportion given on page 2 of this paper.

25. For 1909 records are complete for Redrock, which is some miles below Cliff; also at Alma, all as given on pages 221 and 224 of Water-Supply Paper No. 269. The Redrock total, 153,520, and the Alma total, 74,300, give a ratio of about 2.1, which compares fairly well with the Cliff-Alma ratios of $2\frac{1}{2}$, $2\frac{1}{2}$, and $2\frac{1}{2}$, as given above. Hence, as with Cliff and Alma amounts, these amounts for Redrock and Alma are increased 20 per cent to represent San Carlos.

26. For 1910, Water Supply Paper No. 289, page 202, gives for Redrock 53,960 acre-feet, and on page 207 it gives 11,865 acre-feet for Alma. But the Alma record seems erroneous in gauge height or gauge reading or in rating. Only four times during the year was the discharge measured—one time giving a discharge of 28 second-feet for a gauge height of 0.96 feet, and another giving 7.8 second-feet for a gauge height of 1.95 feet, or a foot higher than before. That the Alma discharge for 1910 must be erroneous is further evidenced by synchronous observations farther down the river at Clifton from October 23 to December 31, of which the gauge readings and discharge measurements are recorded on page 208 of Paper 289. The discharge at

Clifton between these dates appears on blue-print sheet furnished to the board in 1913, amounting to 1,950 acre-feet for the last nine days of October, 5,910 acre-feet for November, and 3,300 acre-feet for December. Alma, as given on page 207 of paper No. 289, amounted to only 230 acre-feet during the last nine days of October, 1,080 acre-feet in November, and 1,490 acre-feet in December, which amounts to only about a fourth of the flow at Clifton. Were the same relation to hold throughout the year, the flow at Clifton would be nearly four times the 11,900 attributed to Alma, or about 46,000 acre-feet, which added to the Redrock 53,960, would make a total of 99,960 acre-feet, Clifton being so far downstream from Alma, an increase of only 10 per cent over Redrock and Clifton, instead of 20 per cent, is used to represent the flow at San Carlos, making the amount there 109,956 acre-feet. This analysis of data for 1910 is not of itself satisfying, but a comparison with the rainfall and with the Roosevelt Reservoir supply both indicate that the supply at San Carlos for 1910 was not less than the above adopted amount of 109,956 acre-feet. The same Paper No. 289 on pages 204, 210, and 211, shows that during the last four months of 1910 gauges were read by the railroad agent at San Carlos on the San Carlos River and on the Gila, and a few discharge measurements were made on each. These indicate a somewhat smaller flow at San Carlos than on the upper rivers; but this would be expected in this case, for, throughout the period of observation, the river was low, the greatest rise being only 0.9 of a foot, which makes the comparison worthless for estimating flood waters, which alone furnish to the lower river the bulk of its total flow.

27. For 1911 and 1912 the records are on advance blue-print sheets furnished to the board in 1913, and are said to be provisional, subject to some possible later revision. They cover the gaugings at Guthrie and Clifton on the upper rivers, and at Kelvin below the mouth of the San Pedro River.

28. The 1911 Guthrie record appears complete, giving a total of 165,646 acre-feet.

29. The 1911 Clifton record contains but 13 days of January, but the Alma record of gauge heights for the same month, given on another blue print, shows the flow to be as great during the other 18 days, hence 8,000 is added to the recorded 5,750 acre-feet.

30. This Alma gauge record also indicates that the flow during the first six days of February, not observed at Clifton, was as great or greater than during the rest of the month; hence 2,000 is added to Clifton's February run-off. These Alma gauge heights also show as great a flow for April, not observed at Clifton, as for February, hence 9,000 is entered into Clifton 1911 April. The Alma record also shows the river practically dry for May, June, and July, hence for each of these months zero is used. Clifton 1911 thus completed gives a total of 175,960, which added to Guthrie's total of 165,646 makes 341,606. This increased by 10 per cent, making 375,767, is used for San Carlos 1911; the 10 per cent increase being used instead of 20 per cent because Guthrie and Clifton are so much farther downstream than Cliff and Alma or Redrock and Alma.

31. For 1912, the Guthrie record is complete in gauge heights, but the floods occurring on March 11 and 12, and on July 23, 24, and 25

are omitted from the calculated discharges. But those omissions can be approximated from the ratings indicated on the blue print, as follows: 5.9 feet=280 acre-feet, 6.9 feet=840 acre-feet, 7.9 feet=1,620 acre-feet, 8.9 feet=2,940 acre-feet. Using for the continuation of this curve, the tangent at its extremity will give results (smaller than the truth) as follows: 19,400 to be added for March 11 and 12, and 20,900 to be added for July 23, 24, and 25, raising the 1912 Guthrie total to 172,090.

32. For 1912 the Clifton record states that the readings for October and November are doubtful, but Alma gauge readings for 1912 on blue print show October to be not less than September, hence 8,000 is entered for October; also that November flow is but little less than December, hence 6,000 is added to Clifton for November. August gauge readings are considerably greater than September readings at both Alma and Clifton, hence 10,000 is entered for August. July being a big month at both Guthrie and Kelvin, we can not do less than enter 20,000 for July. Clifton thus completed totals 176,975 acre-feet. Adding to this Guthrie's total of 172,090 and increasing, as in 1910 and 1911, by 10 per cent, gives 383,972 for San Carlos, 1912.

33. That the amounts adopted for San Carlos, 1911 and 1912, are not too large, and may be somewhat too small, is shown by the Kelvin records. No gauge readings were made at Kelvin till January 26, 1911, but according to Guthrie and Clifton, January had much more flow than February, hence 30,000 is added to January at Kelvin, making 35,820 acre-feet. The July gauge readings at Kelvin for the 25 days not computed indicated 39,300 acre-feet, which is added to the recorded 51,900, making 91,200 for the month. The year 1911 at Kelvin, thus completed, totals 426,200 acre-feet. Were this reduced, like figures at the Buttes, by 10 per cent, it would give for San Carlos, 1911, 383,598 acre-feet instead of the adopted 375,767 acre-feet.

34. The Kelvin 1912 record appears complete, making a total of 450,691 acre-feet, which if reduced 10 per cent, as in the preceding case, becomes 405,622 acre-feet for San Carlos instead of the adopted 383,972 acre-feet.

35. A general comparison of all the adopted yearly supplies for San Carlos, with the rainfalls and with the Roosevelt Reservoir water supply, indicates that the percentages of increase applied to the flows of the upper rivers are not too large, and may be somewhat too small; but they are the more acceptable on that account, being, it is thought, in every instance conservative.

36. The figures determined as indicated in this paper are in tabular form at the end of this appendix. The mean yearly discharge of 346,568 acre-feet appearing in this table, though it be the basis for estimating silt, should be reduced for use when considering the average yearly amount available for storage, for it is probable that portions of the greatest run-offs would not be impounded but lost. If it be assumed that excesses over 600,000 acre-feet in yearly run-offs be lost, the remaining average is 323,000 acre-feet, and only 310,000 acre-feet if excesses over 500,000 acre-feet be wasted. It is very improbable that with a reservoir of not less than 500,000 acre-

feet capacity the losses over spillway would have been so much as to reduce the average supply available to less than the 310,000 acre-feet.¹

37. The table below gives compilation of mean monthly rainfall at 14 stations distributed over the San Carlos watershed for long terms of years. In this tabulation Fort Apache station is included to represent such part of the mountainous area in that vicinity as is tributary to the San Carlos Basin. It is interesting to note that the grand monthly means of the 14 stations agree very closely with the monthly means at Station Oro, which is near the geographical center of the group.

Mean rainfall over San Carlos Basin for a term of years.

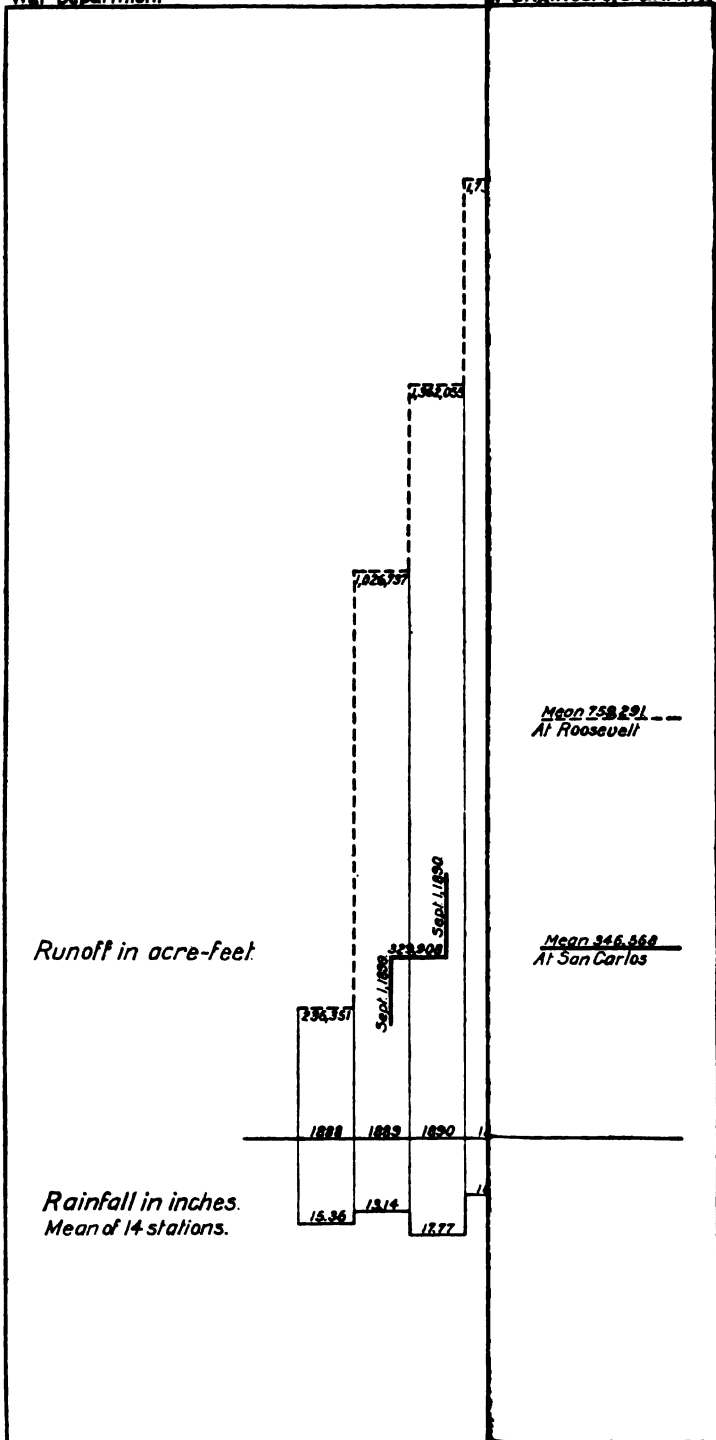
Name of station.	Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Fort Apache.	37	1.33	1.67	1.66	0.81	0.55	0.53	3.00	3.57	1.63	1.24	1.14	1.47	18.66
Luna.	13	.79	1.14	.83	.47	.49	.69	2.52	2.81	2.06	1.26	1.10	1.21	15.37
Alma.	16	.92	.90	1.13	.50	.52	.71	2.62	2.53	1.92	1.75	1.11	.76	15.17
Oro.	23	1.04	1.22	1.01	.40	.40	.47	2.01	2.39	1.52	1.02	.54	.97	12.99
Fort Bayard.	46	.89	.97	.76	.32	.30	.76	3.11	3.24	1.95	1.15	.71	.78	14.95
Lordsburg.	31	.61	.48	.56	.16	.21	.26	1.84	1.65	1.05	.79	.48	.69	8.78
Cliff-Gila.	14	1.07	.80	.63	.37	.18	.51	2.77	2.49	1.79	1.12	.88	1.08	13.69
Duncan.	5	.53	1.16	.97	.34	.25	.26	1.39	1.85	1.42	.82	.80	1.29	11.08
San Simon.	29	.41	.44	.67	.09	.14	.14	.97	1.06	.56	.35	.39	.46	6.26
Bowie.	45	.90	1.57	1.13	.15	.24	.53	2.74	2.88	1.16	.64	.65	1.07	13.75
Willcox.	31	.76	.89	.86	.15	.23	.25	2.11	2.44	.97	.89	.61	.72	10.58
Fort Grant.	38	1.05	1.18	.89	.39	.41	.53	2.78	2.94	1.60	1.60	.82	1.16	14.23
Fort Thomas.	28	.88	1.12	.81	.32	.46	.25	1.69	2.22	1.00	.86	.81	1.04	11.46
San Carlos.	31	1.36	1.49	1.15	.39	.26	.16	1.64	2.55	.99	.89	.94	1.28	13.00
Mean.	.....	.90	1.07	.93	.35	.32	.43	2.23	2.51	1.40	1.01	.78	1.00	12.85

38. Herewith are also two diagrams, No. 8, showing relation (or sometimes want of relation) between mean monthly rainfall over the watershed and the mean monthly run-off at San Carlos, and No. 9, showing for the periods covered by the records the yearly rainfall on the watershed above San Carlos, the yearly run-offs at San Carlos, and the yearly run-offs at Roosevelt Dam. The former shows the relatively greater run-offs in winter months when evaporation is least, and the markedly greater run-offs in March and April due to melting snows. The latter diagram shows in a graphic way, more readily than do the figures, that the water supply at San Carlos is nearly half as great as the water supply at Roosevelt Reservoir.

¹ Records received from the United States Geological Survey after this paper was written give the flow at Kelvin, Guthrie, and Clifton for the first nine months of the year 1913, as follows:

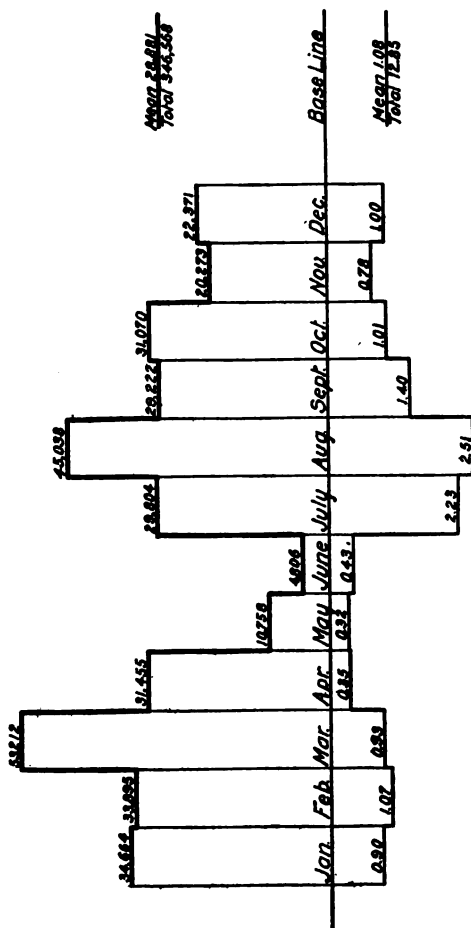
1913	Kelvin.	Guthrie.	Clifton.*
	<i>Acre-feet.</i>	<i>Acre-feet.</i>	<i>Acre-feet.</i>
January	13,500	5,510	3,320
February	36,900	6,780	5,880
March	45,800	16,800	14,000
April	17,600	26,200	.....
May	4,180	5,370	8,180
June	940	2,280	3,220
July	11,600	2,240	5,120
August	18,900	4,210	6,650
September	9,880	11,100	5,360
	159,300	80,490	51,720

* The Clifton record is incomplete, several days having been missed.



Irrigation Project.

MEAN MONTHLY RAINFALL AND RUN-OFF SAN CARLOS RESERVOIR.



The heavy line represents the mean monthly water supply in acre-ft. at San Carlos for 19 years (seasonal year Sept. 1, 1889 to Sept. 1, 1900 and calendar years 1899 to 1912 inclusive).

The light line represents the mean monthly rainfall in inches at 14 stations over the water shed including all observations prior to 1913.

Diagram No. 8. San Carlos Irrigation Project

Run-off of Gila River at San Carlos, Ariz.

Year.	January.	February.	March.	April.	May.	June.
1890 ¹	37,631	28,890	21,416	12,745	4,815	1,500
1895.....	(56,000)	(14,000)	(5,000)	(0)	(17,000)	(5,000)
1896.....	21,914	10,824	13,392	9,640	1,771	268
1897.....	71,167	44,135	38,549	37,166	12,396	2,785
1898.....	35,417	24,242	26,175	29,294	16,159	12,496
1899.....	17,597	11,948	7,194	3,320	996	276
1900.....	(5,000)	(10,000)	(50,000)	306	150	33
1901.....	8,670	61,600	26,200	3,530	338	156
1902.....	6,119	3,078	625	0	0	0
1903.....	10,400	2,960	2,200	3,010	136	6,370
1904.....	1,949	1,875	676	315	535	0
1905.....	56,808	142,644	263,112	237,396	55,519	15,200
1906.....	20,916	53,040	116,640	58,800	20,652	5,227
1907.....	200,640	105,360	68,520	44,400	21,456	13,236
1908.....	(30,000)	(72,000)	(42,000)	(38,000)	(9,000)	(0)
1909.....	11,436	17,760	80,040	47,520	17,616	3,937
1910.....	27,456	12,683	11,165	8,999	3,784	2,904
1911.....	27,665	19,239	114,290	19,525	744	3,090
1912.....	11,825	7,733	123,530	43,780	21,320	19,855
Total.....	658,610	644,009	1,011,024	597,646	204,396	91,312
Mean.....	34,664	33,895	53,212	31,455	10,758	4,806

Year.	July.	August.	September.	October.	November.	December.	Total.
1890 ¹	7,196	173,600	6,854	8,890	11,353	15,218	329,906
1895.....	(25,000)	87,602	43,485	87,269	59,070	41,559	458,985
1896.....	79,744	44,825	52,483	229,381	55,535	34,808	554,585
1897.....	31,267	44,216	126,978	(51,000)	5,000	(5,000)	464,967
1898.....	111,886	29,716	14,459	4,272	5,409	16,873	327,512
1899.....	73,300	25,100	24,800	(15,000)	(10,000)	(5,000)	194,529
1900.....	16	12,200	55,800	3,690	10,500	6,270	153,965
1901.....	23,200	29,600	12,600	4,150	13,300	6,760	190,104
1902.....	1,309	48,698	5,821	0	0	34,286	99,936
1903.....	3,280	59,200	13,300	6,520	3,300	2,180	112,856
1904.....	8,793	58,540	13,800	50,730	6,664	18,820	162,697
1905.....	6,120	27,100	32,400	9,160	112,020	53,603	1,011,082
1906.....	8,820	38,484	10,308	7,015	8,664	78,120	426,686
1907.....	15,564	52,590	50,928	19,956	26,232	17,052	635,904
1908.....	(33,000)	(50,000)	(12,000)	(5,000)	(11,000)	(36,000)	(338,000)
1909.....	13,440	29,736	23,244	7,662	7,877	13,116	273,384
1910.....	2,783	5,764	5,346	7,788	11,440	9,944	109,956
1911.....	57,310	16,115	29,590	54,340	17,985	15,895	375,767
1912.....	64,240	22,660	21,021	18,612	14,845	14,542	383,972
Total.....	566,277	855,716	555,215	590,335	385,194	425,051	6,584,785
Mean.....	29,804	45,038	29,222	31,070	20,273	22,371	346,568

¹ Seasonal year Sept. 1, 1889-Aug. 31, 1890.

Figures in parentheses are estimated.

Year.	Whence obtained.	Source of information.
1890	Buttes minus 10 per cent. ¹	W. S. P. No. 33, p. 30.
1895	Buttes minus 10 per cent; Aug. 1-Dec. 31.....	Do.
1896	Buttes minus 10 per cent.....	Do.
1897	Buttes minus 10 per cent; Jan. 1-Oct. 3.....	Do.
1898	Buttes minus 10 per cent.....	Do.
1899	Buttes minus 10 per cent; Jan. 1-July 10, and San Carlos, July 10-Sept. 1.....	Do.
1900	San Carlos, Apr. 3-Dec. 31.....	Blue-print record.
1901	San Carlos.....	Do.
1902	do.....	W. S. P. No. 85, p. 35; rejecting blue-print record.
1903	do.....	Blue-print record.
1904	do.....	Do.
1905	San Carlos and Clifton, and Alma plus 20 per cent.	W. S. P. No. 175, pp. 162 and 170.
1906	Clifton and Alma plus 20 per cent.....	W. S. P. No. 211, pp. 123 and 128.
1907	do.....	W. S. P. No. 249, pp. 176, 178, 179, 180.
1908	Supplied from rainfall and mean of same months in other years.	
1909	Redrock and Alma plus 20 per cent.....	W. S. P. No. 269, pp. 221 and 224.
1910	Redrock and Clifton plus 10 per cent (Clifton deduced from Alma).	W. S. P. No. 289, pp. 202-207, 208, and blue-print record.
1911	Guthrie and Clifton plus 10 per cent.....	Blue-print record.
1912	do.....	Do.

¹ Kelvin in 1911=426,220; in 1912=450,591.D. E. HUGHES.
C. H. MCKINSTRY.

APPENDIX G.

AMOUNT OF SILT THAT WOULD BE DEPOSITED IN A RESERVOIR AT SAN CARLOS.

1. The silt problem, being next in importance to the sufficiency of the water supply and the suitability of the dam site, requires the most careful analysis of all available data.

2. The board, at its first meeting, decided not to make observations of the river's flow, knowing that a few months' work could add but little to the more extensive data already available. But a reading of the different silt determinations here and elsewhere, and the conclusions based thereon, suggested the need for further observation and experimentation to make more useful the varying data obtained under different conditions, recorded in different terms, and reduced under different hypotheses. For instance, volumetric percentages have, in different times and places, been determined in tubes of different diameters and of different lengths, and after settlement for different periods, such as: "Till water is clear," "Till settlement ceases," "Several days," "One day," "Seven days," and "One month." And different factors have been used to reduce such volumetric percentages to the volume of soil such mud would make. Even words used by one have been misunderstood by another, thus: "Solids," as used by one to represent resulting earth or soil with its voids, as is clearly indicated elsewhere in his report, is assumed later by another to mean an absolute solid without pores or voids. Again, in reducing percentages by weight to volume of earth the sediment would finally make, the earth has been assumed to weigh all the way from 50 to 120 pounds per cubic foot in place after being dried, notably, 53 pounds, 62½ pounds, 85 pounds, and 100 pounds. Not all the above variations apply to the data on the Gila River, but they are to be borne in mind when comparing various findings on different rivers.

3. The observers in the past would now, at the present stage of the evolution in silt determination, doubtless agree that volumetric percentages indicated depend on diameter of tube, for the smaller tubes, by the relatively greater influence of the friction or adhesion of their walls lessen the progressive daily settlement of the mud contained and on length of tube used, for the higher column of mud must settle relatively faster through having its lower portion more compressed by the weight of the mud above. Also that in like tubes, the character of the silt, including its specific gravity, remaining the same, the higher the column of mud the greater the reduction from day to day in the indicated percentage.

4. They would agree, too, that if any divisor, as 5, will correctly reduce a column of mud to its final volume in reservoir soil, a higher column of mud would, on account of its greater initial compression, require a lower divisor, while lower columns would need divisors of

6 or 7 or more. Also that, for like reason, there can be no fixed relation between the volumetric percentage and the percentage by weight, and for the further reason that percentage by weight depends also on the specific gravity of the silt material, which may vary from perhaps as low as 2.1 to as high as 2.7.

5. And there would be agreement that weight of soil in place after being dried is proportional to the specific gravity of its material, and also dependent upon percentage of voids; and that after excess water has once escaped through drainage or evaporation the percentage of voids can hardly exceed 56 per cent, nor in soil not subjected to great compression fall short of 45 per cent, except in case of admixture with coarse sand or gravel; and that the variation between the 56 per cent and the 45 per cent depends largely on circumstances of deposition—whether the silt particles are graded as to fineness to be deposited in different localities by a free river, which would make the voids greatest and the soil lightest; or whether all grades of silt are constrained to be intermixed in a deposit behind a dam, which would result in somewhat denser, heavier ground. A cubic foot of earth in place with 56 per cent voids must weigh in pounds, when dried, 27.5 times the specific gravity of its material. With voids of 45 per cent the multiplier becomes 34.3.

6. Fine silt, before losing its excess of water, may have voids as high as 60 or 70 per cent or even higher. Such silt deposited beyond the reach of sand, in harbors where it can not be drained, remains so light and soft that it is hard to tell by sounding just where its surface lies, and vessels plow through a foot or more of it without material hindrance. But such condition can not long apply to a reservoir occasionally emptied, for after the excess water once departs the superior gravity of the earthy matter prevents readmission of water beyond the capacity of the voids. Dry clay swells a little on being wetted, but repeated drowning and draining reduces its volume.

7. Soil below the surface is somewhat compressed by the weight of the soil above, but not to any great degree under the moderate load that would here obtain. In fact, there can not be within the depth and life of any artificial reservoir a degree of solidifying approaching the transition from silt to shale or sand to sandstone. In any event, nothing approaching the weight of sandstone could be used as a factor in reducing silt, for the increase in weight of sandstone comes not so much from compression of sand as from the infiltration of heavy cementing material displacing water in the voids of the sand bed.

8. Though 55 is the highest percentage of voids found in practice when depositing angular fragments of broken stone of equal screen size, surface earth, no longer subject to overflow, may be so burrowed with vegetable roots and animal life as to make its voids 60 per cent or even more, when the organic matter is expelled. But such conditions can not long survive subsequent depositions, if any, over the same area, for the more porous and permeable ground becomes to a degree a filter bed for the muddy waters until the voids are again reduced.

9. On reflection all would also agree that though the lower strata of silt are compressed by the weight of the upper strata, none of them are at all compressed by the weight of superincumbent reservoir water, for the water maintains a balanced hydrostatic pressure

throughout the voids. The ocean bed beyond the reach of sand, when not of rock, is found to be the softest ooze, though depth be miles and years be countless. Only through occasional exposure to evaporation or drainage to remove excess water can the upper strata of deposited silt be reduced to the consistency and weight of soil, for the weights of silt particles as compared with their surfaces are too small to overcome the adhesion of water and squeeze it out until they come to a bearing on each other.

10. During August, September, and October, 1913, several experiments were made with the silt deposits and with the silty waters of the Gila, to verify and illustrate the foregoing theoretical deductions, and to add a little to the silt data on hand.

11. Fifteen samples of soil deposited from Gila River waters in different localities were accurately determined as to volume occupied in place, and as to specific gravity and weight after being completely dried.

12. Samples Nos. 1 to 4 were taken August 12 from the bed of Picacho Reservoir near its dam at distances of 1, two-thirds, one-third, and 0 mile from its outlet. This reservoir, situated between Florence and Casa Grande, has been in use for 25 years storing surplus Gila River waters from the Florence Canal. Last April some water flowed through it over the localities from which the samples were afterwards taken, but on August 12 it was empty, except for a few gallons at the outlet, where sample No. 4 was obtained.

13. Samples Nos. 5 to 8 were taken August 19 in the silt deposits in the San Carlos Reservoir site along or near the wagon road leading from San Carlos to the dam site. Samples Nos. 9 to 12 were taken October 9, near lower end of San Carlos Reservoir site, in very old river deposits, where a comparatively recent narrow wash 15 feet deep extends from the river a few hundred feet along a cattle trail. Samples 13 to 14 were taken October 13 in old river deposits on left bank of river near road leading from San Carlos to Copper Reef; and sample 15 was taken between camp and dam site.

14. Special care was taken in measuring samples in place. After top earth was removed to get below shrinkage cracks, if any, an annular excavation was carried deeper around undisturbed earth left in the form of a frustum of a cone with level top. On this frustum a sheet-iron pipe was pressed or gently driven to cut a cylindrical sample a few inches long, the earth outside the pipe being trimmed down from time to time when necessary to facilitate the descent. Light tapping on a board held on the pipe was more satisfactory than pressure in overcoming friction without distorting any of the material inside. After undercutting and trimming the bottom off flush with the pipe, there resulted cylindrical samples of known diameter and length of undisturbed earth whose volume in place was thus accurately known. The samples were dried in a cook-stove oven for six hours or more until periodical weighings ceased to show loss. The weights, specific gravities, etc., are in the table following.

TABLE I.—*Weight of Gila River silt deposits.*

Sample No.	Location.	Weight per cubic foot in place.			Specific gravity.	Percentage of voids.	Remarks.
		Earth and water.	Water expelled.	Earth, dry.			
1	Picacho Reservoir, 1 mile above outlet, 1 foot underground; in bottom of trough.	Lbs. 84.2	Lbs. 15.2	Lbs. 69.0	2.33	53	Like adobe; cracked above; tough below.
2	Picacho Reservoir, $\frac{1}{2}$ mile above outlet, $\frac{1}{2}$ foot underground; east of bottom of trough.	81.9	11.8	70.1	2.33	52	More friable than No. 1; some very fine sand intermixed.
3	Picacho Reservoir, $\frac{1}{2}$ mile above outlet, $\frac{1}{2}$ foot underground; bottom of trough.	94.6	25.2	69.4	2.33	52	More like No. 1 than No. 2, but wetter and not so hard.
4	Picacho Reservoir at outlet gate, $\frac{1}{2}$ foot underground.	101.0	35.0	66.0	2.39	56	Black mud, softer than putty; some excess of water.
5	San Carlos, $\frac{1}{2}$ mile below agency, $\frac{1}{2}$ foot underground; bed of old Tonto ditch constructed in 1884, destroyed 1905.	87.5	6.7	80.8	2.55	50	Dry since 1895 except for rains; dredge from canal flow containing considerable sand.
6	San Carlos, 1 mile below agency, $\frac{1}{2}$ foot underground; near river.	85.5	10.0	74.5	2.58	54	Shallow overflow nearly every year; much fine sand; very friable.
7	San Carlos, 2 miles below agency, $\frac{1}{2}$ foot underground; recent deposit uncovered by water 2 days before.	99.6	33.5	66.1	2.56	58	Similar to No. 4, but stiff enough to bear a man, which No. 4 would not do; contains some sand.
8	San Carlos, 3 miles below agency, $\frac{1}{2}$ foot underground; in willows far from river.	82.4	12.3	70.1	2.46	54	Similar to No. 2; shallow overflow on occasional years.
9	San Carlos, $\frac{5}{8}$ miles below agency, $\frac{1}{2}$ foot underground; on bank of wash.	77.5	9.3	68.2	2.73	60	20 feet above river; not flooded in a hundred years; very fine sandy soil; very friable.
10	San Carlos, $\frac{5}{8}$ miles below agency, 15 feet underground; head of wash.	85.3	9.0	76.3	2.72	55	Ancient deposit exposed in bed of recent wash; very fine sandy soil; very friable.
11	San Carlos, $\frac{5}{8}$ miles below agency, 15 feet underground; in side of wash.	89.4	12.0	77.4	2.73	54	Ancient deposit dug from side wall of wash near No. 9; looks like No. 10.
12	San Carlos, $\frac{5}{8}$ miles below agency, 15 feet underground; mouth of wash at river.	86.2	12.8	73.4	2.71	56	Ancient deposit in bed of wash by river; looks like No. 10 and No. 11, but has a few grass roots.
13	San Carlos, left bank of river just below Copper Reef Ford, $\frac{1}{2}$ foot underground.	85.2	4.9	80.3	2.60	51	Old deposit; sandy; probably from Kelly Gulch; near edge of bluff, dry but friable.
14	San Carlos, left bank of river just below Copper Reef Ford, 12 feet underground, in base of bluff 2 feet above river, low water.	104.2	26.3	77.9	2.62	52	Ancient deposit of fine sandy Gila River silt, under No. 13; occasionally soaked by high water, but now partly drained.
15	San Carlos, 6 miles below agency at third river crossing, $1\frac{1}{2}$ feet underground.	98.5	4.7	93.8	2.67	44	Comparatively clean moist medium and fine sand, acceptable for mortar.
Means of all.		.....	.....	74.2	2.54	53	
Means, omitting Nos. 4, 7, and 9.		.....	.....	76.1	2.55	52	

15. No. 4, after a few days' drainage, would doubtless have had its voids reduced to 53 or 52 per cent, which would have raised its weight to 70.1 or 71.6. Likewise No. 7, after a few more days' exposure, would have voids of probably 54 per cent and weight of 73.5 pounds. No. 5 can represent but a small fraction of surface soil deposited by the unrestrained river, for it is to a degree a mixture of finer silt with the coarser and heavier canal dregs; yet it would represent a larger fraction of deposits within a restrained river unable to grade its earthy material.

16. Nos. 1, 2, and 3, from the Picacho Reservoir, do not contain the heaviest material, for that had lodged in the feeding canal or had passed over the diversion dam. Nor do they contain a full quota of the finest and lightest material which reached the reservoir for, during portions of the years the reservoir has been in service, water simply passed through, leaving its heavier silt in the trough where the samples were taken and carrying the rest to make somewhat lighter soil at Casa Grande.

17. If in No. 9 the percentage of voids, made large by the activities of organic life, were restored to 55 per cent, the weight would rise to 76.7 pounds, which is not much lighter than No. 11, which is 15 feet under No. 9. Were it warranted to theorize on so small a difference as a pound it could be suggested that No. 10, being in the bed of the wash, had opportunity to swell on being wetted after relief from load, while No. 11 was dug for, 2 feet into the side wall at its foot, and the few grass roots, together with swelling, would account for the lighter weight of No. 12.

18. Nos. 9, 10, 11, and 12, being all near the river, which on account of the hard bluff on the opposite bank could never have been far away, are the best located for the depositing of material of high specific gravity, and for the most complete grading of particles, resulting in high percentage of voids. No. 13 is heavier than No. 14, because it was dropped on a steeper grade by waters from a tributary. No. 15 represents but a small part of what the Gila River would deposit behind a dam, yet it is quite possible that such sand would amount to one-fifteenth of the whole. Its voids approximate the 43 per cent found in many carloads of run-of-crusher stone, after being jarred by hauling a few miles on a rough track.

19. Assuming that all silt deposits will have on occasional years opportunities to shed excess water, and that only an insignificant part of the whole will be afterwards made lighter by the activities of organic life, it appears from the foregoing table and discussion that the Gila River, without a dam, would drop silt at San Carlos, averaging at least 76 pounds of dried material to the cubic foot of comparatively shallow deposit, and that it would convey by way of the Florence Canal silt making surface soil which would average 70 pounds.

20. The average of the specific gravities of soils in the above table is about 2.54. Averaging the specific gravities of silt passing the dam site, as recorded further along in this paper, gives about 2.46. The difference is due to the lightest material having been carried to a more distant field.

21. If as a result of the impounding dam the heavy and coarse silts were thoroughly intermixed with the fine, the percentage of voids, even in surface soils, would approach that in ordinary building sand, or about 43 per cent, which in connection with a specific

gravity of 2.46, would make soil of 87 pounds. But there would not be such thorough intermixing, except perhaps in a portion of the reservoir, for while the reservoir is yet large, only the finer grades of silt would reach the lower portions of its area, especially its margins, the coarser material being deposited mostly at its head. But it is probable that there would be enough intermixing to raise the weight of surface soil to an average of 80 pounds, corresponding to 48 per cent voids.

22. There has not been an opportunity to obtain within reasonable cost the weight of river deposits at great depths, but it is not unreasonable to think that at depths of 100 feet the weight would be at least an eighth more, or 90 pounds, for it seems probable that a 9-inch layer of surface soil would be compressed to 8 inches or less if loaded for years with a column of earth 100 feet high. Equally reasonable is it then that old deep deposits filling a large reservoir here would average 85 pounds, which is the figure sometimes used by engineers.

23. Though the 85 pounds would now be used with much confidence in computing the life of the proposed San Carlos Reservoir, conservatism requires the use of as low as 70 pounds in calculating the amount of annual dredging that would be required to maintain the reservoir capacity; for the greater portion of the dredging would be in the less compressed comparatively shallow deposits, and a part of it would be of still lighter mass from which excess water had not had an opportunity to escape.

24. To illustrate the effects of diameter and length of settling tubes on the indicated volumetric percentage of mud, several experiments were made in which various tubes were filled from the same sample of muddy river water, and read daily. Three of the results are tabulated, as follows:

TABLE II.

No.	Diam-eter.	Height.	When filled.	Indicated volumetric percentage of mud after settling.									
				1 day.	2 days.	3 days.	4 days.	5 days.	6 days.	7 days.	8 days.	9 days.	10 days.
	<i>Inches.</i>	<i>Inches.</i>	1913										
1	1.01	7.56	Sept. 6	7.5	7.0	7.0							
2	.20	10.00	do	7.5	7.5	7.4							
3	.30	10.00	do	7.0	6.9	6.8							
4	.40	10.00	do	6.5	6.5	6.5							
5	.50	10.00	do	6.8	6.7	6.6							
6	1.15	10.00	do	7.0	6.9	6.5							
7	1.15	31.25	do	6.4	5.8	5.6							
8	1.15	120.00	do	8.3	5.4	3.7							
1	1.01	7.56	Sept. 9	13.5	12.5	12.1	12.0	11.5	11.5	11.2	11.1	11.0	
2	.20	10.00	do	13.1	12.7	12.5	12.5	12.5	12.5	12.5	12.2	12.3	
3	.30	10.00	do	12.1	11.6	11.3	11.2	11.1	11.1	11.1	11.1	11.1	
4	.40	10.00	do	11.2	10.6	10.4	10.3	10.2	10.2	10.2	10.1	10.3	
5	.50	10.00	do	11.8	11.3	11.0	11.0	11.0	11.0	10.8	10.7	10.9	
6	1.15	10.00	do	11.6	11.1	11.0	10.9	10.9	10.7	10.9	10.9	10.5	
7	1.15	31.25	do	12.8	10.8	10.2	10.0	9.9	9.6	9.6	9.6	9.6	
8	1.15	120.00	do	14.4	11.7	9.2	8.3	7.6	6.9	6.5	6.3	6.2	
1	1.01	7.56	Oct. 4	19.0	17.0	16.0							
2	.20	10.00	do	19.0	17.0	16.8	16.2	16.2	16.2	16.2	16.2	16.2	
3	.30	10.00	do	18.2	16.0	15.8	15.5	15.5	15.5	15.5	15.5	15.5	
4	.40	10.00	do	16.8	14.7	14.2	14.2	14.2	14.0	14.0	14.0	14.0	
5	.50	10.00	do	19.0	16.4	15.8	15.5	15.5	15.3	15.1	15.1	15.1	
6	1.15	10.00	do	19.4	18.0	16.2							
7	1.15	31.25	do	20.7	17.2	15.0	12.4	11.4	10.7				
8	1.15	120.00	do	27.6	19.5	18.0	17.4	15.9	15.2	14.6	14.2	13.8	13.4

25. The mud from Nos. 7 and 8 of September 6, when dried, had a specific gravity of 2.47, and was by weight 1.52 per cent of the water from which it was deposited, and would produce 1.35 per cent of soil in place, of which a cubic foot after being dried weighs 70 pounds, or 1.12 per cent of 85-pound soil. The mud from Nos. 7 and 8 of September 9, when dried, had a specific gravity of 2.62, and was 2.95 per cent of the weight of the water, and would make 2.63 per cent of 70-pound soil, or 2.17 per cent of 85-pound soil. The mud from No. 8 of October 4, when dried, had a specific gravity of 2.61, and was by weight 5.49 per cent of the water, and would reduce to 4.89 per cent of 70-pound soil, or 4.03 per cent of 85-pound soil.

26. The inequalities in the one-day percentages are largely due to the practical difficulty in obtaining uniform portions of the same mixed sample—a difficulty which increases with the higher percentages of silt, which settle faster. Particularly is this noticeable in the larger longer tubes into which the water was poured the fastest, entirely emptying the dipper several times. It is not unlikely, however, that the higher initial reading of the 10-foot tube is to some extent due to the time, though 24 hours, being relatively less, because so high a column requires more time to arrive at the same early stage of settlement. Probably the differences were still more marked at the end of 12 or 6 hours. Certain discrepancies in the readings are due to different judgments of two observers as to average height of mud whose top was sometimes inclined or warped.

27. On account of the difficulty of getting into several tubes water of the same degree of muddiness, a long series of experiments would be required to establish the relationship between the determinations of volumetric percentages of silt, made with different sized tubes; but the above show in a general way that mud in the more slender tubes comes to comparative rest at earlier dates—even in so short a time as three days; and that in the longer tubes the reduction in height of mud from day to day is greater and of longer continuance; the mud, at first a dozen or more times as high in the 10-foot tube, reducing one-half in from 3 to 9 days, while that in the slender boiler gauge tubes may undergo a total reduction of but 10 to 20 per cent. It is also noticeable that with the smaller percentages of mud the tubes of small diameter show but little reduction after the first day.

28. The sampling during 1913 was done about half a mile above the dam site, near the foot of Boulder Rapids where, in a length of 100 feet and fall of 3 feet, material coming from above, whether carried there in suspension or rolled along the river bed, must all pass, and is thoroughly mixed. This selection of site for sampling was made to eliminate the unknown quantity which results when sampling is done in a quieter stretch of river where material, if any, rolling along the bottom is not caught.

29. The following are the features of the muddiest sample of the year obtained August 16. In a glass tube of 1.15 inches diameter filled to a height of 31½ inches the daily readings of silt were in percentages as follows:

Time in days	1	2	3	4	5	6	7	8	9	10
Per cent	31.4	27.4	25.0	24.8	23.2	22.6	22.3	22.2	21.9	21.9

This mud, dried, had a specific gravity of 2.44. Its weight was 6.63 per cent of the weight of the clean water which bore it, and 6.22 per cent

of the muddy water which yielded it. It would produce soil of which a cubic foot in place weighs 70 pounds after being dried, amounting to $6.22 \text{ per cent} \times 62.4 \div 70 = 5.56 \text{ per cent}$ of the volume of inflow, or 85-pound soil amounting to 4.57 per cent. The voids in the 70-pound soil would be 54 per cent, and in the 85-pound soil 44 per cent. The 70-pound soil would be 18 hundredths of the 1-day volume of silt, or 25 hundredths of the 7-day volume. The 85-pound soil would be 15 hundredths of the 1-day volume, or 20 hundredths of the 7-day volume.

30. Smaller volumetric percentages of silt, being of less height and therefore less compressed by their own weight, would require still smaller multipliers to reduce them to soil. But not all silts, though volumetric percentages were the same, would give like multipliers to reduce them to soil, for the character of silt as regards denseness in the tube, specific gravity, etc., is not constant, being dependent on its source and on stage of flood. In general, so far as this year's observations go, the first silt to arrive on a flood is of low specific gravity; and the muddiest water and the higher specific gravities have been found a day or two after the peaks of floods had passed by.

31. To verify the conclusion that silt is not compressed by weight of superincumbent water, several experiments were made of putting equal quantities of the same sample of muddy water into the 10-inch and 10-foot tubes and filling the latter the rest of the way with clean water. There was no material difference found in the heights of the deposited silt.

32. Former silt determinations at San Carlos were made not far from the agency, at or near the gauging station, which was on a straight reach of the river free from rapids, and which is therefore a favorable locality for the heavier silt to have separated from that left in suspension and to be rolling along the bottom, and thus escape being included in the recorded percentages of silt.

33. That the amount of material thus traveling and passing a given point in a specified time is relatively small in this case is known from the fact that such movement is for the most part a slow transit of sand waves on whose upstream gentler slopes the material is rolled up to the summits, whence it descends along the steep natural slopes to the bottom, there to rest till a wave length has passed over; and that such waves in so shallow a river are small; and that their travel is not recorded like that of water and suspended silt, in miles per hour, but in feet per day. The quantity of sand found in the silt at the boulder rapids was so relatively small as to indicate that not many sand waves per day were reaching that point. But on account of the oft-repeated reference heretofore made to the additional material rolling along the bottom, and the various guesses as to its quantity, experiments were made to better indicate the probable amount.

34. Since silt determinations at the boulder rapids, where all is mixed, include the material which is presumed to be rolling along the bottom at the old gauging station, parallel observations were made on several days at the two points to show the excess at the boulder rapids. Because the quantity of silt is fitful, whereby samples taken at short intervals sometimes vary considerably—even as much as 25 per cent—the chance of getting abnormal results was avoided by using composite samples consisting each of 8 or 10 samples taken at equal intervals of time, as 1 hour, one-half hour, or one-quarter hour

apart, those at the lower station being timed from 1 to 2 hours later, depending on the stage of the river, to give time for the flow to pass from the upper to the lower point. The results are summarized in the following table:

TABLE III.

Date.	Elements of composite sample.	Location of station.	Volumetric percentage after settling.					Per cent by weight.	Speci- fic grav- ity.	Soil with 52 per cent voids.	Ratio.
			1 day.	2 days.	3 days.	4 days.	5 days.				
1913.											
Sept. 10.	{ 10 (1 hour apart).	{ Old.	8.0	6.8	.....	.....	.....	1.82	2.23	1.70	1.09
		{ Boulder.	8.8	7.6	.....	.....	.....	2.20	2.47	1.86	
Sept. 13, night...	{ 8 ($\frac{1}{2}$ hour apart).	{ Old.	15.7	14.2	13.0	.....	.....	3.60	2.21	3.39	1.11
		{ Boulder.	17.0	16.5	16.0	.....	.....	4.50	2.49	3.76	
Sept. 26, p. m....	{ 10 ($\frac{1}{2}$ hour apart).	{ Old.	18.4	16.0	13.8	13.3	12.9	3.37	2.35	2.98	1.06
		{ Boulder.	22.2	18.0	16.3	15.3	14.9	3.61	2.37	3.17	
Oct. 4, a. m.....	{ do	{ Old.	21.6	17.7	.....	.....	.....	6.00	2.41	5.18	1.10
		{ Boulder.	23.4	19.0	.....	.....	.....	6.68	2.44	5.69	
Oct. 4, 4.30 to 6.15	{ 8 ($\frac{1}{2}$ hour apart).	{ Old.	19.1	16.0	14.3	13.5	13.1	4.28	2.32	3.84	1.16
		{ Boulder.	20.2	17.2	15.4	14.5	14.0	5.05	2.35	4.47	
Oct. 5, 7.30 to 11..	{ 8 ($\frac{1}{2}$ hour apart).	{ Old.	23.5	19.8	17.5	16.5	15.9	4.40	2.41	3.80	1.06
		{ Boulder.	23.9	20.2	18.0	16.8	16.2	4.91	2.54	4.02	
Oct. 7, a. m.....	{ 8 ($\frac{1}{2}$ hour apart).	{ Old.	7.0	7.0	6.8	6.6	.....	1.62	2.49	1.39	1.03
		{ Boulder.	7.5	7.5	7.2	6.9	.....	1.79	2.60	1.43	
	Means.....	{ Old.	16.2	13.8	.....	.....	.....	3.58	2.35	3.18	1.09
		{ Boulder.	17.6	15.1	.....	.....	.....	4.11	2.47	3.49	
	Ratios.....		1.09	1.09	.....	.....	.....	1.15	1.05	1.10	.....

The sampling of Sept. 10 was during the passing of the peak of a 3-foot flood. Sept. 13 was on the decline of the same flood. Sept. 26 was on the decline of a 2-foot flood. On Oct. 4, a. m., the flood reached its height of 3½ feet an hour before the sampling was completed. During afternoon sampling, Oct. 4, the river was down 2 inches below its highest mark of the forenoon, and when sampling on Oct. 5 it was 6 inches down. On Oct. 7 it had fallen to within a foot of low water.

35. In the above table the averages of the one-day volumetric percentages are 16.2 per cent for the old station and 17.6 per cent, or about 9 per cent more, for the Boulder Rapids; and the averages of equivalent soils with 52 per cent voids, or weighing dry 30 times the specific gravity, are respectively 3.18 per cent and 3.49 per cent, the latter being slightly less than 10 per cent in excess. It is interesting to observe that soil of light specific gravity on afternoon of October 4 was near one-fifth of the one-day volume, while on September 26, with much the same volume and specific gravity, the soil was less than one-sixth of the one-day volume. But it is known that the two floods were from different localities.

36. Considering that the above observations were made at times of exceptionally muddy water, and that no sand is found passing Boulder Rapids in times of comparatively clear water, the 10 per cent increase shown by Table III is a liberal allowance to add to the old San Carlos silt determinations to cover the material rolled along the bottom.

37. An experiment was made on compressibility of soil. A sample of earth in place, like No. 11 of Table I, but obtained a little farther from the exposed face, 5½ inches in diameter and 6 inches long, placed on a timber and confined laterally by the sheet-iron sampling tube, was subjected to an end pressure of 100 pounds per square inch. The tube was from time to time tapped lightly all around to reduce its frictional hold on the earth within. In an hour's time the 6-inch column shortened to 5.5 inches, and in 3 days to 5.25 inches. Then

a second follower was placed in the other end of the tube and the load was increased to 150 pounds per square inch, which in 2 days more reduced the length to 4.94 inches. The specific gravity was 2.72. Before compressing, except by the 15 feet of soil once above it, the weight dry was 78.3 pounds per cubic foot, and the voids were 54 per cent. After compressing, the weight was 95 pounds and the voids 44 per cent.

38. The above result supports, in a general way, the assumption that in a once deep reservoir filled with sedimentary soil the increasing density toward the bottom would raise the average weight of soil in place to about 85 pounds per cubic foot, when dried.

39. To indicate how light some silt may be a sample was taken in a slight depression on a river bar. This silt was crossed both ways at intervals of a foot or two with V-shaped shrinkage cracks an inch wide on top and 5 to 6 inches deep. But it would not yet support 50 pounds per square foot and it was almost soft enough to flow. Its weight per cubic foot, wet, was 83.7 pounds; dry, 33 pounds; specific gravity, 2.59; voids, 80 per cent. This, not being soil, is not given a place in Table I, but is here recorded to show how easy it would be to get such weights as 50 and 53 pounds.

40. The San Carlos silt observations of 1913 were made as before stated with glass tubes 1.15 inches diameter filled to a height of 31.25 inches, at the foot of the Boulder Rapids, just above the third crossing of the river, about half a mile above the proposed dam site. The results are in the following table:

TABLE IV.

Date of sampling.	Volumetric percentages after settling for—							Remarks.
	1 day.	2 days.	3 days.	4 days.	5 days.	6 days.	7 days.	
1913.	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	
Aug. 7	2.5	2.3					2.0	Mud of Aug. 7, 8, 9, 10, and 11, weighed dry 3.57 per cent; sp. gr.—2.35.
8	7.0	.....	.....	.....	.....	6.5	6.0	
9	17.3	.....	.....	.....	16.0	15.9	15.5	
10	17.3	.....	.....	16.8	15.3	15.0	14.8	
11	15.0	.....	13.0	12.5	12.5	12.2	12.1	
12	13.0	.....	.....	.....	.....	.....	.....	
13	11.0	.....	.....	.....	.....	.....	.....	
14	9.9	9.0	8.6	8.4	8.3			Mud of Aug. 16, s. g.—2.44. Weight, dry, 6.22 per cent; mud of Aug. 15, 17, and 18, weighed dry, was 3.32 per cent; sp. gr.—2.35.
15	11.5	9.6	9.4	9.2	.....	.....	.....	
16	31.4	27.4	25.0	24.8	23.2	22.6	22.3	
17	18.3	14.8	.....	.....	.....	.....	.....	
18	10.5	.....	.....	.....	.....	.....	.....	
19	7.0	6.8	6.5	6.5	6.4	6.4	6.3	
20	4.9	4.5	4.4	4.4	4.3	4.3	.....	
21	5.2	5.0	4.8	4.7	4.6	4.4		The mud caught from Aug. 19 to Sept. 9, inclusive, was dried and weighed together and amounted to 0.87 per cent of the weight of water. Its sp. gr. was 2.20. Another sample later in the day on Sept. 6 gave results recorded in Table II. Another sample on Sept. 9 gave results recorded in Table II. Another sample on Sept. 10 gave results in Table III. Another sample on Sept. 13 gave results in Table III.
22	2.1	1.9	1.9	1.8	1.7	1.7	.....	
23	1.1	1.0	1.0	1.0	.9	.8	.....	
24	.5	.4	.4	.3	.2	.2	.....	
25	1.0	.9	.8	.7	.6	.6	.....	
26	.4	.3	.2	.2	.1	.1	.....	
27	.1	.1	.1	.1	.1	.1	.....	
28	1.1	.8	.5	.4	.4	.....	.....	
29	3.0	2.8	2.7	2.6	2.6	2.6	.....	
30	4.5	4.0	3.9	3.9	3.8	3.8	3.8	
31	.5	.4	.4	.4	.4	.....	.....	
Sept. 1	.2	.2	.2	.1	.1	.....	.....	
2	8.3	7.5	7.4	7.3	7.3	7.1	7.1	
3	.4	.4	.4	.3	.3	.....	.....	
4	.0	.0	.0	.0	.0	.....	.....	
5	.0	.0	.0	.0	.0	.....	.....	
6	13.3	8.6	8.2	8.1	.....	.....	.....	
7	5.6	5.5	5.4	5.3	.....	.....	.....	
8	8.0	7.7	7.5	7.4	.....	.....	.....	
9	10.4	9.3	.....	.....	.....	.....	.....	

TABLE IV—Continued.

Date of sampling.	Volumetric percentages after settling for—							Remarks.
	1 day.	2 days.	3 days.	4 days.	5 days.	6 days.	7 days.	
1913.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	
Sept. 10	8.3	7.2						
11	6.8	6.4	6.3	6.2				
12	6.2	5.7						
13	18.6	18.0						
14	13.7							
15	7.6	5.7	5.5	5.4				
16	4.0							
17	2.2	2.1	1.9					
18	1.0	.9	.8					
19	.4	.4						
20	.0	.0						
21	.0	.0						
22	.0	.0						
23	.5	.5	.5	.5				
24	.0	.0						
25	4.8	4.6	4.5	4.5				
26	24.6	21.3						
27	13.6	11.2						
28	7.3	5.9	5.8	5.7				
29	3.5	3.4	3.3	3.2	(1)	(1)	(1)	
30	1.0							
Oct. 1	.5							
2	.0							
3	5.7							
4	20.7	17.2	15.0	12.4	11.4	10.7		
5	23.9	20.2	18.2	18.0	16.8	16.2	15.6	
6	14.9	12.4	11.4	11.2	10.7			
7	7.5	7.0	7.0	6.8	6.6	6.5	(1)	
8	5.8							
9	3.5							
10	2.1	2.0	1.8	1.7	1.7			
11	1.5							
12	.8							
13	.2							
14-18	(2)							
19-31	(3)							

Mud of Sept. 10 to Oct. 5, inclusive, excepting Sept. 26 and 29 and Oct. 5, were dried and weighed together and amounted to 1.49 per cent of weight of water, and sp. gr.—2.02.
Another sample on Sept. 26 gave results in Table III.
Other samples on Oct. 4 in Table III.

¹ See Table III.² Trace.³ Clear.

41. From the foregoing data a summary is made of comparisons of volumetric percentages, percentages by weight, specific gravities, percentages of soil of different weights, and ratios, as follows:

TABLE V.

Number of samples averaged.	Place of sampling: O=Old, near Agency; B=Bowlder Rapids.	Volumetric percentage of mud after settling in tube 31.25 inches long and 1.16 inches diameter.		Ratio of 7-day to 1-day percentages.	Percentage by weight after drying.	Ratio of percentage by weight to 1-day volumetric percentage.	Specific gravity of mud, dry and powdered.	Resulting soil in place weighing dry 30 times its specific gravity, thus containing 62 per cent solids.	Resulting soil in place weighing dry 70 pounds per cubic foot.	Resulting soil in place weighing dry 85 pounds per cubic foot.	Ratio of 70-pound soil to 1-day volumetric percentage.
		1 day.	7 days.								
1.....	B	8.3			1.52	0.18	2.47	1.27	1.35	1.12	0.16
1.....	B	14.4	10.8	.75	2.95	.20	2.62	2.34	2.63	2.17	.18
1.....	B	27.6	14.6	.53	5.49	.20	2.61	4.25	4.89	4.03	.18
1.....	B	31.4	22.3	.71	6.22	.20	2.44	5.30	5.56	4.57	.18
10.....	O	8.0			1.83	.23	2.23	1.70	1.62	1.34	.20
10.....	B	8.8			2.20	.23	2.47	1.86	1.96	1.61	.22
8.....	O	15.7			3.60	.23	2.21	3.40	3.20	2.64	.20
8.....	B	17.0			4.50	.26	2.49	3.70	4.00	3.30	.23
10.....	O	18.4	12.2	.66	3.37	.18	2.35	2.98	3.00	2.47	.16
10.....	B	22.2	14.1	.64	3.61	.16	2.37	3.17	3.22	2.65	.15
10.....	O	21.6			6.00	.28	2.41	5.18	5.35	4.40	.25
10.....	B	23.4			6.68	.28	2.44	5.69	5.96	4.90	.26
8.....	O	19.1	12.8	.62	4.28	.23	2.32	3.84	3.82	3.14	.20
8.....	B	20.2	13.7	.68	5.05	.25	2.35	4.47	4.50	3.71	.22
8.....	O	23.5	15.4	.66	4.40	.19	2.41	3.80	3.92	3.23	.17
8.....	B	23.9	15.7	.66	4.91	.21	2.54	4.02	4.38	3.60	.18
8.....	O	7.0			1.62	.23	2.49	1.39	1.44	1.19	.21
8.....	B	7.5			1.79	.24	2.60	1.43	1.60	1.31	.21
22.....	B	3.5	2.8	.80	.87	.26	2.20	.82	.78	.64	.22
18.....	B	6.5			1.49	.23	2.62	1.18	1.33	1.09	.20
5.....	B	12.0	10.2	.85	3.57	.29	2.35	3.16	3.18	2.62	.26
4.....	B	12.8			3.32	.26	2.35	2.94	2.96	2.44	.23
Mean.....		16.0		.67	3.60	.225	2.46				.203

42. Table V indicates, among other things, the irregularity in behavior of silt. But it may be said in general terms that with high percentages of silt in tubes 31.25 inches long, the seven-day volume is about sixty-seven one-hundredths of the one-day volume, though with smaller shorter tubes it may be ninety one-hundredths or more, as indicated in Table II; also, that the one-day volumetric percentage is about four and a half times the percentage by weight, and about five times the 70-pound soil, or six times the 85-pound soil it would make. The 2.46 is doubtless a trifle less than the true average specific gravity of the samples observed, for not grinding fine enough or not working long enough to expel all air would result in errors all one way making results below the truth. Hence, 2.50 is a safer value to assume as the average.

43. In Table IV the seven-day percentages average seventy-nine one-hundredths of the corresponding one-day percentages, which is very different from the sixty-seven one-hundredths derived in Table V, because in Table IV there are included so many smaller percentages from lower mud columns which can not compress themselves so much.

44. The few comparisons made with the 31.25-inch tube used in 1913 and the 7.56-inch, or 100 cubic centimeters, glass used by the United States Reclamation Service, seem to indicate that the percentages read in the latter are higher by ten one-hundredths part in one day and twenty one-hundredths part in seven days, the differences varying somewhat with the heights of columns of silt. The longer tubes were selected in 1913 only to make percentages easier read.

45. The variableness in quantity of silt borne by the Gila River at San Carlos is, as to time, distinctly seasonal, the high percentages being confined to time of thunderstorms and cloud-bursts, lasting three or four months, beginning in June or July. During the other eight months the water is comparatively clean. From January till June this year (1913) river water was used in the drillers' camp and the mud deposited in the bottom of the barrels varied from a stain to about three-eighths of an inch. But on June 17 came the first summer flood and the first percentage of silt high enough to give the river a bad name. From that time on till in October there were numerous flashy, muddy floods with comparatively clear water between.

46. In this connection it is profitable to compare the Gila River at San Carlos with the Rio Grande at San Marcial and El Paso, situated, respectively, above and below the Elephant Butte Dam now under construction. Of five conservative, disinterested men familiar with both rivers, either as drillmen or stockmen, one would not venture a judgment as to which river is the muddier; another thought there is practically no difference; and three thought the Rio Grande carries the higher average percentage of silt, one of them specifying that the percentage of silt during the season of clearer water is higher at Elephant Butte than at San Carlos.

47. A comparison of the two rivers is indicated also by Bulletin No. 83, of New Mexico College of Agriculture, which states on page 70: "This river (Rio Grande) carried more sediment throughout the year than any other stream in the United States, unless it be the Colorado River. (See Table II.)" And Table II on pages 62-63 of same publication gives suspended matter in parts per 100,000 by weight as follows:

Rio Grande.....	San Marcial.....	956.78
Rio Grande.....	El Paso, Tex.....	794.97
Hondo.....	Roswell.....	669.05
Colorado.....	Yuma, Ariz.....	994.00
Little Colorado.....	Woodruff, Ariz.....	718.17
Salt.....	Roosevelt, Ariz.....	126.02
San Francisco.....	Alma.....	152.46
Gila.....	Near San Carlos, Ariz.....	407.38

A footnote states that the above data are compiled from Water Supply Paper No. 274, United States Geological Survey. On examining Paper 274 it is found that the data were determined in 1905-6, and that the above figures are the averages of many separate recorded analyses covering the times of observations.

48. On page 160 of Paper 274 the mean of all silt determinations on the Rio Grande at San Marcial from May, 1905, to May, 1907, is given as 0.853 per cent by weight which would result in soil, of which a cubic foot in place would, on being dried, weigh 85 pounds, amounting to $0.853 \text{ per cent} \times 62.4 + 0.85 = 0.626$ per cent of volume of inflow. But because the larger flows of the winter and spring months

bore less than the average amount of silt, the mean soil to water ratio for the two years is given as 0.445 instead of 0.626. Because drier years have generally higher percentages of silt the 0.445 is on page 162, raised to 0.536 per cent to represent 85-pound soil over a term of 12 years.

49. The most exhaustive presentative of the Rio Grande silt determinations is the Department of State publication entitled "Silt in the Rio Grande," by W. W. Follett, giving observations at El Paso from May, 1897, to June, 1910, and at San Marcial from August, 1905, to January, 1913, all in the most approved form of percentage by weight dry, together with the corresponding discharge of the river. The highest percentages by weight given for El Paso are 10.50, on page 27, and 10.44, on page 28, which are considerably in excess of the highest recorded on the Gila River. The San Marcial table, however, on pages 31 to 52, contains many higher percentages—even up to 21.36 per cent by weight. It may well be doubted that so high a percentage can be carried throughout the cross section of the river on the grade it has at San Marcial, but such sampling may be sometimes possible next the bottom of a river, which will show too much, not only because it is too silty to represent the average of the river at the time, but also because it does not travel as fast as the river. However, the large number of high percentages, when compared with the findings for several years on the Gila, leave hardly a doubt that the Rio Grande at Elephant Butte is muddier than the Gila at San Carlos.

50. The general average for 16 years at San Marcial, deduced by Mr. Follett, is that the volume of soil in place, weighing when dried 53 pounds per cubic foot, will be 1.66 per cent of the water supply. Substituting the 70 pounds and 85 pounds herein used for Mr. Follett's 53 pounds the 1.66 per cent becomes 1.26 per cent to represent surface earth to be periodically dredged, or 1.04 per cent to represent old deep deposits to fill the reservoir.

51. Another important fact easily deduced from Mr. Follett's very complete tables and useful alike at San Carlos, since the physical conditions are similar, is that the variations in percentage of mud are pronouncedly seasonal, for by averaging the monthly percentages given by Mr. Follett on pages 61 to 64 there results the grand averages tabulated below:

TABLE VI.—Average monthly percentages of soil carried in suspension by the Rio Grande at San Marcial, N. Mex., in 16 years.

Month	Reciprocal of ratio of water supply to suspended matter reduced to soil of which a cubic foot in place weighs on being dried.				
	53 pounds.			1897 to 1912	
	1897 to 1904	1905 to 1912	1897 to 1912	70 pounds.	85 pounds.
January.....	1.06	0.41	0.66	0.50	0.41
February.....	1.16	.68	.86	.65	.54
March.....	1.40	1.20	1.25	.95	.78
April.....	2.47	.88	1.44	1.09	.90
May.....	1.36	.95	1.09	.82	.68
June.....	.77	.77	.77	.56	.45
July.....	2.03	4.90	4.11	3.11	2.56
August.....	4.75	4.72	2.73	3.58	2.95
September.....	4.87	3.72	4.17	3.16	2.60
October.....	3.04	5.10	3.88	2.78	2.42
November.....	1.94	1.87	1.90	1.21	.99
December.....	.93	.95	.94	.71	.59

In the last column of the above table, the four muddy months average 2.63 per cent and the eight clean months average 67 per cent. Special attention is called to these results, for they help to support the similar though smaller figures to be compiled from the Gila River data, particularly the segregation of the year into two seasons—the very muddy and the comparatively clean.

52. The following is a compilation of all known Gila River silt data:

53. In Water-Supply Paper No. 33, on page 36, is a quotation from Mr. Arthur P. Davis's report of 1896, as follows:

Attempts have been made, however, by private parties from time to time to measure the amount of suspended material. The most important and reliable of these measurements were those made by Mr. Albert T. Colton, in the month ending August 7, 1893, and by Mr. W. Richins, at the Buttes. Mr. Colton found the percentage of silt by volume averaged 2.2 per cent. As these observations were taken and reduced by Mr. Colton, who is a competent engineer, they are adopted as correct. The observations by Mr. Richins extended from July 29 to December 31, 1895. They were taken by the following method:

A sample of the water was poured into a slender glass tube until it reached the height of 100 divisions on a convenient scale, and was then allowed to settle several days, until the main portion of the water was clear. The height of the sediment on the same scale was then read and the result recorded as the percentage of mud carried by the water. The existence of this record and the ease with which more of such observations could be taken, made it important that an approximate relation be established between the volume of this mud and that of the actual solid matter it contained. For this purpose several laboratory determinations have been made with muddy samples of Gila water by settling and reading the volume of mud as above and then drying the residue at 100° C. and determining its volume.

These observations indicate an average ratio of dry matter to mud of about one-fifth, and this factor has been used to reduce the mud observations of Mr. Richins to solid matter.

It should be remembered that these observations take no account of material that is rolled on the bottom of the stream.

54. By "solid matter" and "dry matter" in the above is meant earth which would fill a reservoir, as is plainly shown by the use of it in the report. In another place the same is called "solids."

55. In Paper 33, on pages 37 and 38, are the observations by Mr. Richins, in tabular form, from which monthly totals are taken as follows:

TABLE VII.—*Silt observations at The Buttes in 1895.*

Time.	Total water.	Total solids.	Percentage.
	<i>Acro-feet.</i>	<i>Acro-feet.</i>	
July 29 to 31.....	6,094	237	3.89
Aug. 1 to 31.....	97,336	2,213	2.27
Sept. 1 to 30.....	48,317	1,579	3.27
Oct. 1 to 31.....	96,966	3,032	3.13
Nov. 1 to 30.....	65,633	554	.84
Dec. 1 to 31.....	46,177	89	.02

56. Further observations, made and reduced in the same manner as above, were taken at The Buttes from January 1, 1899, to July 31, 1899, and tabulated on page 39 of Paper 33, giving monthly totals as follows:

TABLE VIII.—*Silt observations at The Buttes in 1899.*

Time.	Total water.	Total solids.	Percent-age.
	<i>Acro-feet.</i>	<i>Acro-feet.</i>	
Jan. 1 to 31.....	19,552	30	0.15
Feb. 1 to 28.....	13,273	7	.05
Mar. 1 to 31.....	7,993	1	.01
Apr. 1 to 30.....	3,689	1	.01
May 1 to 31.....	1,107	0	.00
June 1 to 29.....	31	0	.00
July 1 to 31.....	73,060	1,854	2.54

57. The above Tables VII and VIII taken together, though for different years, cover a year and three days and show four muddy months and eight clear ones.

58. Valuable silt observations were made at the head of Florence Canal below The Buttes from November 28, 1899, to November 5, 1900, and recorded in Bulletin No. 44, University of Arizona Agricultural Experiment Station, by R. H. Forbes. The record, as given on page 185 of the bulletin, is by weight in parts per hundred thousand. The recorded determinations are of composites each of about a week's sampling, and the corresponding river flow is not given. Hence only averages of analyses made each month will be used, for the nearest river gauging during the time was at San Carlos, and it is known that floods in the San Pedro materially affected the results. The monthly averages are as tabulated below:

TABLE IX.—*Silt observations below The Buttes in 1899-1900.*

Time.	Silt parts per 100,000.	Per cent by weight.	Soil in place weighing when dried—	
			70 pounds.	85 pounds.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Nov. 28 to 30.....	73	0.07	0.06	0.05
Dec. 1 to 31.....	60	.06	.05	.04
Jan. 1 to 18.....	45	.05	.04	.03
Feb. 1 to 28.....	12	.01	.01	.01
Mar. 1 to 7.....	12	.01	.01	.01
Aug. 1 to 28.....	3,037	3.04	2.71	2.28
Sept. 1 to 30.....	5,117	5.12	4.56	3.76
Oct. 1 to 31.....	145	.15	.13	.11
Nov. 1 to 5.....	293	.29	.26	.21

The high percentages in August and September are attributed largely to San Pedro floods of that year by Prof. Forbes in accounting for relatively large percentages of black alkali found those months, which has its source largely in the granite rocks of the San Pedro watershed, and as stated on page 191 of the bulletin, the weather maps showed the San Pedro to be largely the origin of those particular floods. Hence the percentages for August and September would have been considerably smaller had they been determined above the

San Pedro at San Carlos. On page 188 of the bulletin Prof. Forbes refers to the San Pedro as "perhaps the muddiest tributary of the Gila."

59. A more definite opinion on the relative amounts of silt at The Buttes and at San Carlos appears in the First Annual Report of the Reclamation Service, by F. H. Newell, chief engineer, which, on page 83, states as follows:

Observations at The Buttes reservoir site on Gila River have revealed such high percentages of solid matter as to render the maintenance of a reservoir at that site expensive. Investigation has shown, however, that a large proportion of the silt received by the Gila waters comes from the basin of the San Pedro River * * *. The San Carlos Reservoir is located above the San Pedro Basin, and while it intercepts the water supply furnished by the headwaters of the Gila proper—the San Francisco, Eagle Creek, and other streams flowing from the lofty Mogollon Mountains, which furnish very little solid matter to the reservoir—it escapes the silt-laden waters of the San Pedro which joins the river below.

From these considerations it is believed that less sediment will be encountered in the waters of the Gila at San Carlos than at The Buttes. Observations have been made which confirm this expectation.

60. The earliest known record of silt determinations made at San Carlos is that by the United States Geological Survey in 1901, kindly furnished by the Phoenix office of the United States Reclamation Service, which is in tabular form as follows:

TABLE X.—*Sediment at San Carlos for 1901.*

Month.	Discharge.	Sediment.	
	<i>Acres-feet.</i>	<i>Per cent.</i>	<i>Acres-feet.</i>
January.....	7,575		
February.....	59,020		
March.....	29,843		
April.....	3,325	0.0	0.0
May.....	329	.0	.0
June.....	204	.0	.0
July.....	22,304	1.43	318.5
August.....	32,531	2.44	794.6
September.....	24,615	1.28	314.6
October.....	6,440	1.35	85.8
November.....	15,667	.06	12.0
December.....		.04	

The percentages in the record are only to tenths. The 0.04 per cent for December is taken from page 82 of First Annual Report of the Reclamation Service. January, February, and March, not given above, are known to be very low in percentage of silt.

61. Sediment observations at San Carlos in 1902 are published in First Annual Report of the Reclamation Service on page 82, in form as follows, excepting the last two columns:

TABLE XI.—*Sediment observations at San Carlos in 1902.*

Month.	Cubic centimeter of water tested during the month.	Sediment.		Percentage of dry material to total amount of water.	Run-off in acre-feet for the month.	Total volume of dry material in acre-feet for the month.	Percentage of soil weighing 70 pounds per cubic foot when dried.	Percentage of soil weighing 85 pounds per cubic foot when dried.
		Cubic centimeter of wet material.	Grams of dry material.					
January ¹	3,100	.....	0.1135	0.0000366	6,119	0.22	<i>Per cent.</i> 0.003	<i>Per cent.</i> 0.003.
February.....	.....	.....	.....	.....	.....	.....	Clear.	Clear.
March.....	.....	.....	.....	.....	.....	.....	do.	Do.
April.....	.....	.....	.....	.....	.....	.....	do.	Do.
May.....	.....	.....	.....	.....	.....	.....	do.	Do.
June.....	.....	.....	.....	.....	.....	.....	do.	Do.
July.....	400	² 29	.....	.....	.....	.....	1.45	1.20.
August ³	3,100	260	83.92	.02707	48,698	1,318.25	2.41	1.99.
September ³	3,000	86	7.63	.02464	5,821	14.34	0.22	0.18.
October.....	.....	.....	.....	.....	.....	.....	Clear.	Clear.
November.....	.....	.....	.....	.....	.....	.....	do.	Do.
December.....	1,600	62	.....	.....	.....	.....	0.30	0.25.

¹ Water clear February to June.

² The 29 in third column is 39 in the record, owing to error in addition as seen on detailed observations received from the Phoenix office of the Reclamation Service.

³ Water clear in October and November.

62. It is to be observed that in this table the run-off is multiplied by the percentage of dry material to give acre-feet in column seven, from which it is inferred that a cubic foot of soil in place was assumed to weigh, after being dried, the same as water, or 62.4 pounds. The last two columns are now added to include soils at 70 pounds and 85 pounds, for use in this paper. On examination of discharge records it appears that some of the months called "clear" in the above silt record, are reported dry, namely, April, May, June, October, and November.

63. No record has been found of silt observations, if any, made in 1903.

64. For the year 1904, an unpublished record has been furnished by the Office of Director of United States Geological Survey, "showing comparative turbidity and sediment determinations made of the water of Gila River at San Carlos, Ariz., by R. H. Ross under instructions of Sheldon K. Baker, hydrographic aid, from July 21 to October 24, 1904." The record shows that determinations of sediment were made "by allowing sedimentation for 24 hours in a 100 cubic centimeter graduate."

65. These determinations made by Dr. Ross are especially valuable in showing results occurring during the first months of ordinary flood flows following 5 years of drought, and also following a period of dry river, for the discharge record shows the river dry from May 20 to July 20, and nearly dry for months before. Such dryness of the land and the river bed followed by the numerous moderate floods, as shown by the discharge record, are expected to give the highest percentages of silt. The completeness of these records as to percentage and flow, both made by the same trained mind, makes the

best exhibit of what would be expected to be the muddiest seasons at San Carlos; hence, the daily volumetric percentages from the one record, and the corresponding daily discharges from the other record, are here reproduced in the following table:

TABLE XII.—*Sediment observations at San Carlos, in 1904.*

Day.	July.		August.		September.		October.	
	Sediment, one-day volume.	Discharge.	Sediment, one-day volume.	Discharge.	Sediment, one-day volume.	Discharge.	Sediment, one-day volume.	Discharge.
	Per cent.	Sec.-ft.	Per cent.	Sec.-ft.	Per cent.	Sec.-ft.	Per cent.	Sec.-ft.
1	13.0	260	13.0	260	8.5	440	Trace.	20
2	22.0	511	8.5	220	2.5	20	2.5	20
3	20.0	940	9.0	270	Trace.	20	Trace.	20
4	19.0	330	8.0	1,300	Trace.	20	Trace.	20
5	15.0	1,400	13.0	1,168	Trace.	20	Trace.	20
6	15.0	1,900	15.0	640	Trace.	70	Trace.	70
7	14.0	2,300	11.0	320	2.0	1,040	2.0	1,040
8	15.0	960	10.0	120	10.0	4,120	10.0	4,120
9	14.0	320	6.5	75	13.0	5,320	13.0	5,320
10	14.0	960	3.5	80	12.0	5,876	12.0	5,876
11	13.0	810	1.5	71	13.0	1,540	13.0	1,540
12	15.0	630	1.5	215	9.0	970	9.0	970
13	10.0	340	5.0	400	5.5	710	5.5	710
14	11.0	341	7.5	185	3.5	507	3.5	507
15	17.0	240	4.0	130	2.5	430	2.5	430
16	18.5	2,040	6.0	210	2.0	369	2.0	369
17	15.0	1,810	6.0	165	1.0	545	1.0	545
18	12.0	680	5.0	95	7.0	485	7.0	485
19	9.0	490	5.0	85	2.0	410	2.0	410
20	12.0	1,230	4.0	60	1.5	417	1.5	417
21	15.5	2,345	2.0	60	0.5	400	0.5	400
22	16.5	230	13.0	1,000	1.0	50	0.5	323
23	19.0	453	10.0	3,200	3.5	230	0.5	320
24	18.5	360	13.0	1,100	14.0	100	0.5	330
25	21.0	290	8.0	490	17.0	85	.....	245
26	18.0	150	9.0	300	3.0	55	.....	185
27	16.0	235	8.0	300	2.0	32	.....	182
28	9.0	350	8.0	660	1.0	32	.....	180
29	21.0	90	8.0	730	0.5	32	.....	180
30	9.0	1,580	8.0	530	0.5	20	.....	158
31	12.0	670	8.0	390	.....	.....	.....	155
Total	182.0	4,442	403.0	29,527	183.0	6,945	88.5	26,560
Arithmetic means	16.55	.....	13.00	.....	6.10	.....	2.85	.....
Means for month ¹	16.86	.....	13.58	.....	8.70	.....	8.82	.....
Soil, at 70 pounds	3.37	.....	2.72	.....	1.74	.....	1.76	.....
Soil, at 85 pounds	2.78	.....	2.24	.....	1.43	.....	1.45	.....

¹ "Means for month" are derived by dividing the sums of the daily discharges into the sums of the products of such discharges multiplied by their corresponding percentages of sediment.

66. The reduction to 70-pound soil is made by dividing by 5, as indicated in Table V. Considering that Table V is based on water columns 31.25 inches high, while in Table XII, 100 cubic centimeter test tubes, which are much shorter, were used, the divisor 5 is doubtless too small for application here, but the difference is on the side of conservatism. It is probable that the July percentage would have been smaller had the river been running throughout the month.

67. The sediment data for 1905 is found on page 41 of Water Supply Paper No. 274, which gives determinations in milligrams per liter, or parts in a million by weight, of suspended matter in 30 composite samples taken between April 9, 1905, and January 2, 1906. The volumetric percentages in samples taken morning and evening from March 22 to December 22, 1905, read after 24 hours settlement in 100 cubic centimeter graduated glass tubes, are in unpublished record, of which

a copy has been kindly furnished by the Phoenix office of the Reclamation Service. The river's discharge at San Carlos during a portion of the year, covering the muddy months and more, is in an unpublished record furnished by the United States Geological Survey. From these three sources, the following tables are compiled.

68. First, a comparison will be made between the 1-day volumetric percentages and the percentages by weight, for the gentleman who did the sampling has written that of the same sample well mixed, one part was subjected to the volumetric test and the other was sent to the laboratory for analysis.

TABLE XIII.—Comparison of volumetric and weight percentages of silt in 1905.

Dates.	One-day volumetric percentages.		Percent- age by weight.	Ratio.
	For respective dates.	Average.		
Apr. 9, 10, 11, 12.....	6.2; 5.8; 5.6; 5.8.....	5.85	0.9830	0.17
Apr. 17, 18, 19, 20.....	5.2; 4.2; 4.1; 4.0.....	4.33	.5410	.12
Apr. 24, 25, 26, 28, 29.....	5.8; 6.5; 7.5; 2.8; 5.8.....	5.68	.9580	.17
Apr. 30; May 3, 4, 5, 6.....	3.5; 2.0; 3.5; 4.8; 2.6.....	3.28	.4150	.12
May 10, 11, 12.....	2.0; 2.0; 0.2.....	1.40	.2270	.16
May 14, 16, 17, 18, 19.....	No record.....	.....	.1770	.....
May 22, 23, 24, 25, 26, 27.....	do.....	.....	.1020	.....
May 28, 29, 30, 31; June 2.....	0.8; 0.8; 0.6; 0.5; 0.4.....	.62	.0710	.12
June 9, 10, 11, 12, 13, 14, 15.....	1.5; 3.3; 10; 4.0; 3.0; 2.5; 2.0.....	3.76	.2320	.08
June 18, 19, 20, 21, 22, 23, 24.....	1.6; 1.4; 0.9; 0.6; 0.4; 0.2; 0.1.....	.74	.0474	.08
June 25, 26, 27, 28, 29, 30; July 1.....	Trace; clear; C.; C.; C.; C.; C.....	.00	.0120	.....
July 2, 3, 5, 6, 7.....	Clear; C.; C.; C.; C.....	.00	.0138	.....
July 9, 10, 11, 12, 13, 14, 15.....	Clear; C.; C.; C.; 12.5; 7.0; 2.3.....	3.11	.3170	.10
July 16, 17, 22.....	1.0; 0.8; C.....	.60	.0408	.07
July 23, 24, 25, 26, 27, 28.....	C.; C.; C.; C.; C.; 21.5.....	3.58	.3900	.11
July 29, 30, 31; Aug. 12.....	6.0; 18.5; 14.0; 19.0.....	14.38	2.0400	.14
Aug. 13, 14, 15, 16, 17, 18, 19.....	15.2; 8.5; 7.0; 4.5; 4.0; 4.0; 2.5.....	6.53	.5230	.08
Aug. 20, 22, 23; Sept. 5, 7.....	4.5; 30.3; 30.5; 25.3; 24.7.....	21.06	2.4700	.12
Sept. 10, 16, 21; Oct. 1, 2, 6, 7.....	16.0; 5.0; 1.6; 16.5; 12.5; 5.3; 3.5.....	8.63	.3140	.04
Oct. 8, 9, 10, 11, 12, 13, 14.....	3.5; 2.8; 2.5; 2.5; 1.5; 1.5.....	2.40	.0630	.04
Oct. 15, 16, 17, 21, 22, 23, 24.....	0.6; 0.4; 0.6; T.; T.; T.....	.23	.0240	.10
Oct. 25, 26, 30, 31; Nov. 2, 3, 4.....	C.; C.; C.; C.; C.; C.; T.....	.00	.0126	.....
Nov. 5, 6, 7, 8, 9, 10, 11.....	T.; 3.3; 3.0; 5.2; 16.0; 11.0; 8.1.....	6.66	.9950	.15
Nov. 12, 13, 14, 15, 16, 17, 18.....	5.5; 4.0; 4.5; 2.3; 2.0; 2.0.....	3.19	.3180	.10
Nov. 19, 20, 21, 22, 23, 24, 25.....	2.0; 2.0; 2.0; 4.0; 8.3; 7.0; 6.6.....	4.56	.3940	.08
Dec. 5, 6, 7, 8.....	3.5; 4.0; 2.0; 2.0.....	2.83	.1920	.07
Dec. 10, 11, 13, 14, 15, 16.....	2.5; 2.6; 2.0; 1.0; 1.0; 1.0.....	1.68	.0940	.05
Dec. 17, 18, 19, 20, 21, 22, 23.....	1.0; 1.0; 1.0; 1.0; 1.0; 1.0 (—).....	1.00	.0954	.10
Dec. 24, 25, 26, 27, 28, 29, 30.....	No record.....	.....	.0684	.....
Dec. 31; Jan. 1, 2 (1906).....	do.....	.....	.0540	.....
Mean.....	.....	4.08	.407	.10

69. The above column of ratios is, apparently, so erratic that further inquiry is needed before passing judgment, particularly since similar ratios in Table V lie within much narrower limits; hence reference is made to El Paso determinations to be found on page 400 of the Third Annual Report of the Reclamation Service, where percentages by volume after standing 7 days, and percentages dry, are given in parallel columns, which, by dividing, give ratios as follows: 0.46; 0.25; 0.24; 0.24; 0.28; 0.28; 0.26; 0.26; 0.22; 0.25; 0.24; 0.32; 0.29; 0.32; 0.34; 0.33; 0.34; 0.28; 0.19; 0.27; 0.25; 0.30; 0.15; 0.30; 0.19; 0.24; 0.62; 0.33; 0.92; 0.41; 0.26; 0.46; 0.29; 0.33; 0.19; 0.34; 0.29; 0.14; 0.30; 0.13; 0.15; 0.50. The smaller ratios generally attach to the smaller percentages of silt, but the largest ratios are undoubtedly erroneous. Rejecting all that are above 0.33, the average of the rest is 0.25, which would reduce to 0.20 had the readings been, as in Table XIII, one day instead of seven days. The 0.20 must be still further reduced to apply to Table XIII, for the average seven-day volu-

metric reading at El Paso, from which it is derived, was about 7 per cent, or an equivalent one-day reading of nearly 9 per cent, which, being more than twice the average in Table XIII, would represent silt more compressed under its own weight. Hence the larger ratios in Table XIII, say, 0.10 to 0.17, are not unreasonable, when applied to the relatively smaller amounts of silt in 1905.

70. It is considered that the percentages by volume in 1905, observed by the sampler who knew the condition of the river each day, are more reliable than the published percentages by weight recorded in Water Supply Paper No. 274, for the latter may have been more in the nature of a by-product in analyses intended more for the determination of chemicals than of amount of silt. Hence the unpublished volumetric data will be used for 1905, for somewhat higher quantities of silt will thus appear, which in the present study are the more conservative to adopt; and the highest ratio in Table XIII, namely 0.17, will be used to reduce the volumetric percentages of that year to weight of dry matter, or $0.17 \times 62.4 \div 70 = 0.15$ will be used to reduce to volume of 70-pound soil.

71. The volumetric percentages and discharges are compiled in the following table:

TABLE XIV.—Sediment observations at San Carlos in 1905.

Day.	March.		April.		May.		June.		July.	
	Sediment, 1-day.	Discharge.	Sediment, 1-day.	Discharge.	Sediment, 1-day.	Discharge.	Sediment, 1-day.	Discharge.	Sediment, 1-day.	Discharge.
	P. ct.	Sec.-ft.	P. ct.	Sec.-ft.	P. ct.	Sec.-ft.	P. ct.	Sec.-ft.	P. ct.	Sec.-ft.
1.....					4.2	.....	0.5	355	Clear.	58
2.....					4.2	.....	.4	355	Clear.	40
3.....					2.0	.....	.5	315	Clear.	20
4.....					3.5	.....	.5	300	Clear.	10
5.....					4.8	.....	.4	315	Clear.	5
6.....					2.6	.....	.4	325	Clear.	5
7.....					2.5	.....	.4	300	Clear.	5
8.....					2.3	.....	.5	330	Clear.	5
9.....			6.2	.....	2.6	.....	1.5	410	Clear.	5
10.....			5.8	.....	2.0	.....	3.3	675	Clear.	5
11.....			5.6	.....	2.0	.....	10.0	580	Clear.	68
12.....			5.8	.....	.2	.....	4.0	560	Clear.	40
13.....							3.0	530	12.5	84
14.....			5.5	.....		1,400	2.5	440	7.0	178
15.....						1,340	2.0	400	2.3	105
16.....			2.5	.....		1,280	1.9	290	1.0	96
17.....			5.2	.....		1,230	1.8	225	.8	70
18.....			4.2	.....		1,220	1.6	200	.3	65
19.....			4.1	.....		1,210	1.4	180	Trace.	48
20.....			4.0	.....		1,170	.9	108	Trace.	44
21.....			2.6	.....		1,070	.6	44	Clear.	37
22.....	4.0	.....	2.4	.....		1,020	.4	24	Clear.	20
23.....	4.0	.....	2.8	.....		980	.2	52	Clear.	14
24.....	3.0	.....	5.8	.....		940	.1	42	Clear.	10
25.....	3.0	.....	6.5	.....		820	Trace.	30	Clear.	8
26.....	3.0	.....	7.5	.....		760	Clear.	37	Clear.	6
27.....	3.0	.....	.4	.....		660	Clear.	38	Clear.	6
28.....	3.0	.....	2.8	.....	.8	590	Clear.	45	21.5	112
29.....	2.5	.....	5.8	.....	.8	510	Clear.	55	6.0	660
30.....	2.5	.....	3.5	.....	.6	460	Clear.	68	18.5	740
31.....	2.5	.....		.....	.5	440	.....	.....	14.0	520
Total.....	30.5	.....	89.0	.....	50.6	17,080	38.8	7,656	83.9	3,088
Arithmetic means.....	3.06	.....	4.45	.....	1.63	.....	1.29	.....	2.71	.....
Means for month.....		.....		.....	1.96	.....	2.25	.....	9.14	.....
Soil at 70 pounds.....	.46	.....	.67	.....	.29	.....	.34	.....	1.46	.....
Soil at 85 pounds.....	.38	.....	.55	.....	.24	.....	.28	.....	1.20	.....

Means for month in the above are derived by dividing the sums of the daily discharges into the sums of the products of such discharges multiplied by their corresponding percentages of sediment.

¹ Average gauge height: Apr. 1 to 8, 13.5; Apr. 9 to 30, 14.

² May 14 to 27 averaged about 1 per cent. See Table XIII.

³ Average gauge height: May 1 to 13, 12.7; May 14 to 31, 11.4.

TABLE XIV.—*Sediment observations at San Carlos in 1905—Continued.*

Day.	August.		September.		October.		November.		December.	
	Sediment 1-day.	Dis- charge.	Sediment 1-day.	Dis- charge.	Sediment 1-day.	Dis- charge.	Sediment 1-day.	Dis- charge.	Sediment 1-day.	Dis- charge.
	<i>P. ct.</i>	<i>Sec. ft.</i>	<i>P. ct.</i>	<i>Sec. ft.</i>	<i>P. ct.</i>	<i>Sec. ft.</i>	<i>P. ct.</i>	<i>Sec. ft.</i>	<i>P. ct.</i>	<i>Sec. ft.</i>
1.....	12.0	490	2.6	315	16.5	705	Trace.	62	.....	.....
2.....	12.0	400	3.4	165	12.5	519	Clear.	58	.....	.....
3.....	11.0	340	7.4	215	6.5	540	Clear.	65	5.5	.....
4.....	9.0	277	22.5	700	5.5	457	Trace.	76	4.0	.....
5.....	9.0	215	25.2	675	5.5	358	Trace.	97	3.5	.....
6.....	8.0	220	20.7	1,650	3.5	266	3.3	318	4.0	.....
7.....	6.5	245	24.7	1,310	3.5	184	3.0	261	2.0	.....
8.....	9.0	400	24.5	1,080	3.5	156	5.2	540	2.0	.....
9.....	24.5	1,090	16.0	590	2.8	110	16.0	1,910	2.0	.....
10.....	17.5	830	16.0	700	2.5	94	11.0	1,490	2.5	.....
11.....	23.0	900	12.6	720	2.5	94	8.1	1,130	2.6	.....
12.....	19.0	780	10.7	535	2.5	84	5.5	942	1.0	.....
13.....	15.2	650	15.2	405	1.5	93	4.0	790	2.0	.....
14.....	8.5	670	8.8	335	1.5	108	4.5	580	1.0	.....
15.....	7.0	525	6.5	275	.6	117	2.3	490	1.0	.....
16.....	4.5	340	5.0	180	.4	78	2.0	445	1.0	.....
17.....	4.0	300	4.3	168	.6	65	2.0	440	1.0	.....
18.....	4.0	280	3.5	122	.2	50	2.0	385	1.0	.....
19.....	2.5	195	2.8	94	.2	45	2.0	337	1.0	.....
20.....	4.5	265	2.6	84	Trace.	40	2.0	360	1.0	.....
21.....	7.5	200	1.6	74	Trace.	26	2.0	335	1.0	.....
22.....	20.3	690	.9	68	Trace.	42	4.0	950	1.0	.....
23.....	30.5	275	.9	68	Trace.	44	8.3	2,670	(1)	.....
24.....	31.0	655	3.9	387	Trace.	46	7.0	3,240	(1)	.....
25.....	13.5	510	5.8	738	Clear.	46	6.6	3,070	(1)	.....
26.....	12.0	500	31.0	1,400	Clear.	42	.....	2,600	(1)	.....
27.....	27.0	380	35.0	1,060	Clear.	31	.....	6,150	(1)	.....
28.....	12.0	220	13.0	818	Clear.	28	.....	.....	(1)	.....
29.....	6.2	655	16.0	650	Clear.	37	.....	.....	(1)	.....
30.....	5.5	130	15.5	738	Clear.	54	.....	.....	(1)	.....
31.....	3.4	110	.....	.....	Clear.	55	.....	.....	(1)	.....
Total.....	379.6	13,667	358.7	16,319	74.1	4,637	100.8	29,791	44.6	.....
Arithmetic means.....	12.25	.....	11.96	.....	2.39	.....	4.03	.....	1.54	.....
Means for month.....	14.80	.....	18.18	.....	6.52	.....	6.95	.....	.....	.....
Soil at 70 pounds.....	2.22	.....	2.73	.....	.98	.....	1.04	.....	.23	.....
Soil at 85 pounds.....	1.83	.....	2.25	.....	.81	.....	.86	.....	.19	.....

¹ Dec. 23 to 31 averaged about 0.5 per cent. (See Table XIII.)

For reasons given above in paragraph 70, soil in place, weighing 70 pounds dry, is taken to be fifteen one-hundredths of the one-day volumetric percentages in the year 1905.

72. If each percentage in Table XIII be applied to the corresponding average discharge of the days represented by the composite sample, as far as such discharges are given in Table XIV, the monthly percentages of 70-pound soil become as follows: April, 0.74; May, 0.22; June, 0.17; July, 1.47; August, 1.29; September, 1.74; October, 0.20; November, 0.47; December, 0.09. But, as stated before, the percentages derived in Table XIV will be used in preference to the above, for they are based on fuller data and are higher.

73. So far as known, no further observations were made at or near San Carlos till those of 1913, appearing in Table IV. These have not the river discharges corresponding to them, but they can be made of use. Their averages are: For August, 7.84 per cent; September, 5.67 per cent; and October, 2.81 per cent. Since these months are in the season of muddy river with fluctuating flow, the percentages of silt with respect to the flow is known to exceed the above means of the daily readings; for in this period the little rises are accompanied by higher percentages of silt. Were the percentages of silt proportional to the discharge, then the quotient of their sum divided into the sum of their squares would be the correct result. But the general observation during 1913 has been that, though floods during the

muddy season bring mud, the percentage falls short of increasing as rapidly as the flow; for often the smaller rises carry higher percentages than the larger floods, and generally the muddiest water has been found after the peak of the flood had passed. Taking all the muddy months that have but few, if any, clear water days, and whose records are complete, it is found that on the average their percentages of mean flow representing sediment approximate more closely to the square root of the mean of the squares of the daily percentages than to the quotient of the sum of the squares divided by the sum of the daily observations, as is shown in detail in the following table:

TABLE XV.

Month.	Mean of daily observations.	Sum of squares divided by sum.	Square root of mean of squares.	True means deduced from known discharges.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
August, 1895.....	11.81	14.21	12.94	11.38
September, 1895.....	14.43	16.46	15.41	16.16
July, 1899.....	10.13	16.97	13.11	12.70
July, 1904.....	16.55	17.41	16.97	16.96
August, 1904.....	13.00	14.10	13.54	13.53
September, 1904.....	6.10	9.03	7.53	8.70
June, 1905.....	1.29	4.21	2.33	2.25
August, 1905.....	12.25	17.50	14.64	14.80
September, 1905.....	11.96	19.42	15.24	18.18
Average.....	10.84	14.37	12.41	12.73
August, 1913.....	7.84	15.13	10.89	¹ (11.20)
September, 1913.....	5.67	12.31	8.40	¹ (8.60)
October, 1913.....	2.81	16.02	6.71	(8.00)

¹ Were the daily percentages of silt observed at San Carlos during August and September used in connection with the daily discharges of the river at Kelvin one day later, of which the record has been since received, the resulting mean percentages would be 11.5 for August and 7.3 for September.

74. The flood of October, 1913, fell far more slowly than the percentage of silt decreased. In view of this fact, and of the averages in the above table, it is judged that the most probable percentages for August, September, and October of 1913 are, respectively, 11.20, 8.60, and 8, which, considering that long test tubes were used, reduce to 2.24 per cent of 70-pound soil for August, 1.72 per cent for September, and 1.60 per cent for October. The silt from January to June, 1913, varied, as before stated, from a stain to three-eighths of an inch in the water barrels, or from zero to 1 per cent, making the equivalent of 70-pound soil to average not more than 0.10 per cent during that time. There was but one flood in June; and July had fewer rises than August.

75. Having now exhausted all known data, the results are summarized in the following table, in which the percentages represent soil of which a cubic foot in place would, if dried, weigh 70 pounds, excepting those of 1895, 1899, and 1904, deduced by dividing volumetric percentages by 5, which are now thought to represent a somewhat lighter soil, but are nevertheless used without reduction, since in this analysis all uncertainties are resolved in favor of the higher quantities.

TABLE XVI.—*Summary of silt data for Gila River.*

Month.	Per cent.									Arith- metic mean.	True mean.
	1893	1895	1899	1900	1901	1902	1904	1905	1913		
January.....			0.15	0.04	.....	0.00	.....	.....	0.10	0.07	0.16
February.....			.05	.01	.....	.00	.....	.....	.10	.04	.07
March.....			.....	.01	.....	.00	.....	0.46	.10	.12	.34
April.....			.01	.....	0.00	.....	.....	.67	.10	.30	.59
May.....			.00	.....	.00	.....	.....	.29	.10	.10	.25
June.....			.00	.....	.00	.....	.....	.34	.....	.11	.33
July.....	2.20	3.89	2.54	.....	1.43	1.45	3.37	1.46	.....	2.33	2.53
August.....	2.27	.....	.....	2.71	2.44	2.41	2.72	2.22	2.24	2.43	2.40
September.....	3.27	.....	.....	4.56	1.28	.22	1.74	2.73	1.72	2.22	3.06
October.....	3.13	.....	.....	.13	1.35	.....	1.76	.96	1.60	1.49	2.30
November.....	.84	.06	.....	.26	.06	.....	.....	1.04	.....	.44	.83
December.....	.02	.05	.....	.....	.04	.30	.....	.23	.....	.13	.17

The last column in the above table results from multiplying the percentage for each month in each year of the table by the discharge of that month in that year as given in the table of water supply and dividing the sum of the products by the sum of the discharges. The last column also shows the segregation of the year into four muddy months and eight cleaner months, as in the case of the Rio Grande, shown on page 17; but the clean months are cleaner, corroborating the statements of men who are familiar with both rivers.

76. If the percentages in the last column be now multiplied, each by the average water supply of the corresponding month as given in the water-supply table, and the sum of the products be divided by the average yearly supply, the resulting mean percentage for a term of years is 1.18 per cent.

77. Increasing the 1.18 per cent by a tenth part, to include material rolled on the bottom, as found on page 12 of this appendix, there results 1.30 per cent in 70-pound soil (or 1.07 per cent in 85-pound soil) to represent the total average silt deposit to be expected at San Carlos. This is slightly in excess of the 1.66 per cent of 53-pound soil deduced by Mr. Follett for San Marcial, which reduces to 1.26 per cent in 70-pound soil, or 1.03 per cent in 85-pound soil.

78. In the foregoing analysis pains were taken at every step to use the highest percentages the data could indicate. If, on the other hand, the percentages obtained at the Buttes were reduced on account of the influence of the San Pedro, as indicated by Prof. Forbes and by the First Annual Report of the Reclamation Service, say, only a fifth part, and if the divisor 6 instead of 5 were used to reduce the percentages of 1895, 1899, and 1904 to 70-pound soil; and if the published data for 1905 giving results shown on page 29 were used instead of the unpublished data, the resulting substitutes for the above 1.30 per cent and 1.07 per cent would be 1.02 per cent and 0.84 per cent, respectively.

79. In conclusion, the writer would say, in round numbers, that 40 per cent of the yearly water supply flowing in the four muddy months bears $2\frac{1}{2}$ per cent, and 60 per cent in the clean months bears one-third of 1 per cent, making a total carried in suspension and rolled on the bottom of 1.2 per cent of 70-pound soil, such as would need to be sluiced or dredged to maintain the reservoir, or 1 per cent of 85-pound soil such as would be used to calculate the reservoir's natural life.

D. E. HUGHES.

APPENDIX H.

DAMAGE TO SAN CARLOS AGENCY.

LOS ANGELES, CAL., *October 23, 1913.*

COMMISSIONER OF INDIAN AFFAIRS

(Through Chief Engineer W. M. Reed),
Washington, D. C.

SIR: In compliance with your letter of above reference, there is herewith respectfully submitted an estimate of the damages which would result to the lands, buildings, and other property on the San Carlos Indian Reservation in the event of the construction of the San Carlos Dam and Reservoir. This estimate is based on the assumption that the land would be flooded to the 2,497-foot contour United States Geological Survey datum, or 190 feet above the river bed at the entrance to the box canyon, some 7 miles below the San Carlos Agency.

DAMAGE TO INDIAN LANDS.

No surveys are available showing the exact location and extent of the several classifications of lands which would be submerged by the proposed reservoir, and it was therefore necessary to procure data for the estimate from the following sources: Map of the San Carlos Reservoir site, surveyed by the United States Geological Survey in 1899, furnished by Lieut. Col. C. H. McKinstry; map of the agricultural lands of the San Carlos Reservation prepared by Superintendent of Irrigation J. M. Martin in 1909; estimates of the irrigated land prepared in 1913 by Perry McMiron, farmer at San Carlos Agency, and from personal observation and paced measurements sufficient to verify the areas obtained from the above maps. The total area of the land submerged, at the 2,497-foot contour, consisting of 14,250 acres, is the estimate given by Mr. D. E. Hughes, United States engineer in charge of the field work for the United States Army board.

For the purpose of valuation, the land has been divided into three general classifications. That which is actually under ditch, called "Irrigated land;" that which is suitable for irrigation, and could be irrigated provided water were available, designated as "Land susceptible of irrigation;" and that which is not suitable for irrigation, either through unsuitable surface conditions, or the inferior character of the soil, called "Grazing land."

The area of the three classifications is as follows:

	Acres.
Irrigated land.....	559
Land susceptible of irrigation.....	1,371
Grazing land.....	12,320
Total area.....	14,250

It is believed that the above subdivision is substantially correct, though a difference of opinion may arise as to what constitutes land "susceptible of irrigation." This area was placed by the United States Geological Survey in 1899 as approximately 4,000 acres, and must have included large areas of river wash, which in the opinion of the writer are unfit for cultivation. The amount of agricultural land that existed at the time the survey was made was also considerably reduced by a destructive flood occurring about 1906. The amount of irrigated land is taken from the records of the agency farmer, who has made careful measurements of the same.

The value of irrigated land along the Gila River near Safford ranges from \$100 to \$200 or more per acre, varying in accordance with the nature of its water supply, its location, and other physical conditions. Inasmuch as the Indian land is located along a railroad, and an excellent market exists in Globe, it seems only fair to value the Indian land at \$100 per acre, even though its water supply is not of the best, and the methods of the Indian farmer compare unfavorably with those of the whites.

The value of irrigated land per acre may be roughly divided into the following parts:

Water right (main canal, etc.).....	\$35
Clearing and grubbing.....	20
Leveling.....	20
Bordering or fencing.....	10
Land.....	15

Total..... 100

On the above basis the value of the raw land is placed at \$15 per acre. These figures agree substantially with those paid for the land flooded by the Roosevelt Reservoir. There the value of raw land was placed at from \$10 to \$15 per acre. While there is no data available for the prices paid for irrigated land as such, the ranches containing a certain percentage of irrigated land sold for from \$30 to \$50 per acre. Assuming that 25 per cent of the land was irrigated and it sold for an average price of \$30 per acre, the value of the irrigated land would be \$75 per acre. Taking into consideration the increase in land values since the purchase was made 11 years ago, and the fact that this land was 40 miles or more from a market, it appears that \$100 per acre is not an excessive value for the irrigated Indian land at San Carlos. The value of the nonirrigable or grazing land which would be submerged by the reservoir is placed at the nominal figure of \$1.25 per acre, as it has substantially this value for grazing purposes.

On the basis of the above values, the cost of the three classes of submerged lands is as follows:

Irrigated land, 559 acres, at \$100 per acre.....	\$55,900
Land susceptible of irrigation, 1,371 acres, at \$15 per acre.....	20,565
Grazing land, 12,320 acres, at \$1.25 per acre.....	15,400

Total value of submerged land..... 91,865

In the above estimate no provision has been made for the land that will be required through the change in location of the Globe, Gila Valley & Northern Railroad which crosses the reservoir site, for the reason that the present right of way, easement over which is owned by the railroad, and for which the Government has been reimbursed, is included in the estimate of the above areas, and inasmuch as the old and new rights of way are of substantially the same length and they traverse practically the same character of land, no monetary difference would be involved. On this basis, however, it will be necessary to grant the Globe, Gila Valley & Northern Railroad a new right of way free of expense. The cost of moving the railroad is an item that the United States Army Board has itself taken up.

ROADS.

There are approximately 15 miles of roads, and several wooden bridges, within the reservoir site, having a probable average value of \$600 per mile, or \$9,000. If the dam and reservoir are built it will be necessary to construct not less than 25 miles of new roads and a number of bridges to take the place of those submerged, and to utilize the proposed bridges across the San Carlos and Gila Rivers appropriated for in the Indian service bill for fiscal year 1914. To build these roads and bridges will cost not less than \$1,000 per mile and probably more, and no congressional appropriation has been made for their construction.

BUILDINGS AND OTHER IMPROVEMENTS SUBMERGED.

In estimating the damage which will result by the submersion of the buildings and improvements there are at least three ways in which the valuation of these might be considered. One is, the actual cost of construction; another, the present value; the third, the cost of reproduction of similar structures at the present time. This last method has been employed, as it was impossible to obtain the original cost, and even with these figures available the actual cost would remain uncertain, owing to extensive repairs and alterations that have been made from time to time. This method is assumed to be the fairest, for if this dam is constructed and the buildings submerged, it will probably be necessary for the Government to expend a certain sum of money to construct additional buildings of at least equal cost, if it is desired to continue the operation of the San Carlos Agency some other place.

It is not assumed that it is necessary to attempt to determine where such agency should be located, or even to consider the desirability of constructing a new agency. In considering this question, however, it should be borne in mind that the agency was originally a military post, and some of the buildings are perhaps larger than would be required simply for an Indian agency, and that there are several which may not be necessary to the proper conduct of the Government's business.

Several buildings are in a very dilapidated condition, and it is the expectation to tear down two or three of these and obtain materials with which to improve and rebuild some of the others.

The expense of rebuilding the cottages needed with the material from those not needed, will probably be enough to just about offset the value of those cottages destroyed, so that the total value would be approximately the same as that given under the cost of reproduction.

Plumbing fixtures, wall decorations, and other improvements of like nature, are included in the value of each building.

Such improvements as walks, trees, lawns, and the adornment of the grounds, are of material value and essential to a well-operated public institution. The expense of these, however, has not been included, as the evident cost of reproduction is problematical, depending upon the location of any new agency.

Included in the improvements listed there is a sewer system, which cost about \$1,500, and which is not first class.

There is a domestic water supply system, including a number of large dug wells, lined with concrete and heavy timbers, which would cost \$2,000 to replace. The steel pipe distribution system, together with two elevated water tanks, could not be reproduced for less than \$2,000 additional.

There are many what might be termed fixed improvements, such as boilers in their settings, engines, pumps, piping, flour-mill machinery, and various structures and appliances whose value for removal would be practically nothing. These have been included in one sum, which is probably less than would be the cost of similar installation.

In the following table, giving the estimated cost of reproduction, note is made opposite each building, giving the probable depreciation. The application of this depreciation, if advisable, will give a fair present worth:

Name of building.	Material of building.	Cost of reproduction.	Depreciation.
No. 1.....	Adobe and tufa stone.....	\$2,390	<i>P. et.</i> None.
No. 2.....	do.....	2,390	None.
No. 3.....	Tufa stone.....	6,810	None.
Garage at No. 3.....	Frame.....	275	None.
No. 4.....	Adobe and tufa stone.....	2,240	None.
No. 5.....	do.....	2,330	None.
No. 6.....	do.....	2,240	None.
No. 7.....	do.....	2,840	None.
No. 8.....	Adobe.....	1,090	70
No. 9.....	do.....	1,444	70
No. 10.....	do.....	1,312	70
No. 11.....	do.....	1,332	70
No. 12.....	do.....	1,070	70
No. 13.....	do.....	990	50
New office.....	Tufa stone.....	3,640	None.
Guard house.....	Sandstone and adobe.....	2,750	25
Main warehouse.....	Sandstone.....	3,600	10
Warehouse "B".....	Adobe.....	1,530	60
Warehouse "A".....	Adobe (old office).....	4,280	70
Beef issue house.....	Adobe.....	885	40
Granary.....	Frame.....	280	20
Policeman's barn and granary.....	Frame and sandstone.....	740	40
Farmer's quarters.....	Frame.....	680	60
Indian police houses.....	8 frame, at \$75.....	600	25
Do.....	Frame.....	100	25
Hide house.....	do.....	310	10
Slaughter house.....	do.....	463	10
Lumber storage.....	Sandstone and frame.....	2,330	10
Oil house.....	do.....	300	25
Shops.....	Sandstone.....	5,500	10
Indian employees house.....	Frame.....	200	30
Do.....	do.....	150	30
Agency corral and stables.....	Adobe and frame.....	5,380	30
New cottage.....	Frame.....	530	None.
Trading store (rented).....	Adobe.....	970	30

¹ Not needed, except for its material.

Name of building.	Material of building.	Cost of reproduction.	Depreciation.
Trading store warehouse.....	Frame.....	\$680	P. ct. 40
Hospital, engineer, and nurses hotel, and quarters.....	Adobe.....	5,550	10
Grist-mill and ice-plant building.....	.....	3,360	10
Traders residence (rented).....	.....	1,110	40
Team shelter, sheds, frame fences, outbuildings, etc.....	.....	1,000	10
School building.....	Sandstone.....	11,500	10
Domestic Science building.....	Adobe.....	2,550	10
School shop.....	Adobe and frame.....	100	50
Sewing building.....	Frame.....	370	20
Bath house.....	Adobe.....	770	10
Teacher's cottage.....	do.....	3,420	10
Sewer system.....	.....	1,500	30
Domestic water wells.....	Timber and concrete.....	2,000	10
Tanks and water system.....	.....	2,000	50
Machinery, foundations, piping, pumps and forges, and nonmovable improvements.....	.....	5,000	30
		104,883	

In addition to the structures listed above, which belong to the United States, there are privately owned buildings which will be submerged by the construction of the San Carlos Dam.

The buildings belonging to the Indians, which are of frame construction and are evidences of the Indians' advance in civilization as compared to the tepees of grass and canvas usually occupied, should be paid for without question. There were found the following, which would be submerged:

20 Indian houses, frame, \$75 each.....	\$1,500
1 Indian house, frame, \$350.....	350
2 Indian sheds, frame, \$25 each.....	50
Total.....	1,900

Some of the buildings occupied by the whites have been built by traders or others whose equity in the buildings may not be such as to entitle them to reimbursement. The buildings of this character, which are in private ownership and which will be submerged, are as follows:

Name of building.	Material of building.	Cost of reproduction.	Depreciation.
Old traders' plant.....	Adobe.....	\$3,460	P. ct. 40
Traders' warehouse.....	Frame.....	465	40
Traders' barn.....	Frame and adobe.....	350	40
Mission Church.....	Tufa stone.....	1,850	10
Traders' cottage.....	Frame.....	200	25
Total.....		6,325	

RECAPITULATION.

On the above assumption the total amount of damage done to the land, buildings, and other improvements on the San Carlos Indian Reservation, through the construction of the proposed San Carlos dam and reservoir, will be as follows:

Reservation lands.....	\$91,865
Reservation roads.....	9,000
United States buildings and other improvements.....	104,883
Buildings belonging to Indians.....	1,900
Total.....	207,648

To the above it may be necessary to add the present value of the buildings occupied by whites, amounting to \$4,380, and \$14,000, the difference between the estimated

value of the present roads which would be submerged, and the estimated cost of constructing similar roads to take their place. The addition of these amounts gives a grand total of \$226,028, the amount of the damages.

In conclusion it may be stated that some of the buildings, such as warehouses, shops, stables, and lumber storage, are probably larger than the needs of the agency require, as they were constructed for the Army which, at the time, required larger facilities in these lines than does the Indian agency. However, there are other features in connection with a modern, up-to-date agency which are not provided here, whose increased cost would about equal any saving due to decrease in size due to possible use of smaller structures for purposes named above.

Therefore, the total cost of reproduction, which will be the expense to the Government if the present plant is submerged, is considered fair.

Trusting that the above information may meet the requirements of the United States Army Board engaged in the investigation of the San Carlos project, I am,

Very respectfully,

C. R. OLBERG,
Superintendent of Irrigation.

ESTIMATE OF POSSIBLE DAMAGES BY SAN CARLOS RESERVOIR.

SAN CARLOS, ARIZ., October 28, 1913.

The COMMISSIONER OF INDIAN AFFAIRS,
Washington, D. C.

SIR: There has been submitted to me a copy of Indian Office letter of September 4, 1913, citation above, addressed to the Chief Inspector of Irrigation, which directs that a competent engineer visit this locality and make estimates of the damages which would result to the lands, buildings, etc., which would be affected by the San Carlos Dam and Reservoir, if built. The direction to the engineer is to make report jointly with the superintendent, "or separately if they can not agree." These indirect instructions were confirmed in a telegram to the superintendent, dated October 7, 1913.

I agree with Engineer Olberg as to the value of the property within the proposed reservoir site and concur in his findings as far as they go.

In addition, I am of the opinion that a value should be placed on the dam site itself. It is properly an asset—and a very valuable one—of these Indians. When this reservation was set apart for the Indians the original orders, as far as I am aware, contained no exemptions whatever. Nothing granted to them should be taken away now without just compensation, or without their consent, voluntarily given.

In behalf of these Indians, notice is now given that the right of any authority to take any of their lands or other property for any purpose, without their consent, is denied. This phase of the question will be presented through your office at the proper time.

Respectfully,

A. L. LAWSE.

COMMENTS ON MR. OLBERG'S REPORT.

1. The board's project includes a road to run on the north side of the reservoir from the railroad to the dam. It is understood that if the Government will build bridges across the Gila and San Carlos Rivers, above the reservoir flow line, Graham and Gila Counties stand ready to construct a road between them. This will leave not more than 10 miles of road to be constructed, and reduces the item for roads to \$10,000.

2. Mr. Olberg's estimated "cost of reproduction" of the buildings seems fair. But the new buildings would be of more value than are the present ones, by the amount of depreciation noted in Mr. Olberg's report. The total of the depreciated values, which is \$84,013, measures the real damages.

3. Regarding land damages it is the understanding of the board that this reservation is not owned by the Apache Nation. If the United States owns it, and if this irrigation project were solely for the benefit of the Pima Indians and entirely at the expense of the Government, it would be idle to pay damages except on improve-

ments belonging to the Indians, for the Government would be only transferring money from one pocket to another. But the project is also for the benefit of private lands that would receive a gift if the reservoir site be assessed at less than its value. Hence the project should pay for the land regardless of where the title lies. Mr. Olberg's prices on the various classes of lands are reasonable, and his estimate of land damages is accepted.

4. The estimates modified as indicated in these comments, are then as follows:

Reservation lands.....	\$91,865
New roads.....	10,000
Government buildings, etc.....	84,013
Buildings belonging to Indians.....	1,900
Total.....	187,778

The value of the buildings owned by the white inhabitants is about \$4,380; whether or not compensation should be allowed for these is doubtful. If allowance be made for moving Government stores and the effects of whites and Indians, and for contingencies, the sum total will not exceed \$200,000.

APPENDIX I.

SILT DISPOSAL.

1. The mean annual flow is 346,568 acre-feet.

The percentage of silt is 1.3 per cent.

The volume of silt per year is 4,500 acre-feet, but it is estimated that about one-sixth would escape, leaving only 3,750 acre-feet in the reservoir.

The reservoir capacity to be maintained is 500,000 acre-feet.

2. With dam 160 feet high to spillway, the reservoir capacity is only 481,826 acre-feet. With a height of 170 feet, the capacity is 588,576 acre-feet, which is 88,576 acre-feet in excess of the 500,000 desired to be maintained. Hence either desilting or raising of dam higher than 170 feet would become necessary in $88,576 \div 3,750 = 24$ years. With dam 180 feet high to spillway, the capacity is 709,626 acre-feet, or 209,626 acre-feet in excess of the 500,000, and desilting would need to begin in 56 years from date of construction, or 32 years from date of raising of dam.

3. The time (24 years) in which the dam of 170 feet would need to be raised is so short that it would be found cheaper to build to full height, 180 feet, at once, for with plant installed and force of men organized and experienced, it is probable that the addition would be made in the first instance for two-thirds of what it would cost at the later date. Besides, if the dam be not of the overfall type, there would be rock excavation for spillways for the lower dam, part of which would be not only useless in connection with the higher dam, but would necessitate expense in damming to the higher grade. The cost of such rock excavation as would be at the later date useless, together with the cost of damming the lower spillways, would amount to as much as the cost of the upper 10 feet of the final dam. Moreover, considering damages, the higher flood line around the reservoir would be at this time as easily and nearly as cheaply established as the lower one, whereas to raise the line at the later date would doubtless require removal of roads, habitations, and other improvements in the meantime established close to the lower reservoir as improvements are now being established on the floor of the reservoir.

4. While the figures show that with the higher dam storing to an elevation of 180 feet the capacity would not be reduced by silting to 500,000 acre-feet in less than 56 years, yet desilting had better begin at an earlier date, for by the earlier beginning the cost of desilting, including cost of desilting plant, would likely be better equalized, since in the earlier years the desilting could be suffered to be less in amount than the estimated 3,750 acre-feet per annum, while later, through gain in experience and probable improvement in methods,

the larger amount, 3,750 acre-feet, would likely be handled without increase in yearly cost. Another reason for earlier beginning is that silt would be less solidified than it would be in the deeper older deposit if no work were done for 56 years. A third and more important reason is that the irrigated lands will soon become in need of the fertilizing material. The date when desilting had better begin can not be foretold with certainty, but the Government should retain the power to execute the work at the expense of the irrigated lands whenever it shall deem such work advisable.

5. The location of the area to be desilted should be nearest the dam, abandoning the remote parts of the reservoir, for the principal item in the cost of desilting, whatever the mode, will be that of conveying the silt to the dam. The floor of the area to be maintained is assumed to average 10 feet above the present floor of the valley, partly on account of the irregularities in the topography which it would be impracticable to follow closely with a traveling plant and partly because, at any time, only a portion of the area would be down to grade, the remainder being "bank" of 10 to 20 feet on which to dredge more economically.

6. Considering the ever-changing height of reservoir water and the variableness of the amount of water to be discharged, it will be a matter requiring good judgment to determine from time to time just where the desilting plant should operate. A first thought may be that the plant should always hug the margin, following the shallow water down, in order to minimize the lift of mud, but this would result in finally having too extensive a level floor on which operations would have to suspend for want of sufficient depth of water long before the reservoir had become empty. Since the greater deposits will be on the lower levels of the reservoir, because the muddy waters will be oftenest there, desilting will sometimes need to be in depths greater than would be required for the mere operation of the plant. Matters thus far considered indicate that the bed of the maintained reservoir had better approximately follow the present floor of the valley.

7. The desilting operations would not be carried laterally into all the indentations of the shore lines or contours nor would they extend to the present 180-foot contour, for seldom would water be so high, and besides the plant would require a working depth of 10 or 15 feet. Hence the present 160-foot contours on the east and west sides are assumed to be the approximate lateral limits of the reservoir to be maintained, and the northerly limits, to provide a capacity of 500,000 acre-feet above a surface elevated an average distance of 10 feet above the present bed and below a plane 180 feet high, is found to be an east and west line passing 1 mile north of "agency tank" and crossing the San Carlos and Gila arms of the reservoir, embracing an area of 7,500 acres.

8. The center of gravity of the 7,500 acres is 4.7 miles from the dam, which would be the average haul in dredging uniformly over the bottom, though in practice this would be reduced perhaps to 4 miles, because floods occurring when reservoir water is low will convey much material toward the dam. Besides, floods will maintain some storage capacity beyond the limits of the 7,500 acres, which will obviate the necessity of extending mechanical desilting quite so far upstream.

9. Except for the item of haul, the annual cost of desilting would be independent of the amount of reservoir capacity to be maintained, but the larger the capacity the earlier need be the date of beginning.

10. Desilting is a leading problem involved in the project. From time to time various plans have been proposed. One plan was to have irrigation water discharged through the dam at river bed level; but it is known that with water in the reservoir, the influence of the low outlet in removing silt would extend only a few hundred feet upstream, for the velocity of approach would be so low. Nevertheless there should be an outlet at river bed level for use whenever the river is flowing through an empty reservoir.

11. Another proposal was to have the river flow through empty reservoir and low outlet long enough to excavate for itself a deep bed through the silt deposits, which it would do in time through recession of waterfall; and a bottom width of 200 feet and side slopes of 1 on 4 have been assumed to result from such process. But that would give but a fraction of the reservoir capacity desired to be maintained. If a very large amount of silt were removed in a short time the current in the river bed below the dam would not be able to convey it all.

12. A plan of general merit, outlined in Irrigation Paper No. 33, is to construct a canal of about 300 second-feet capacity above the margin of the reservoir, which, while the river flows, would furnish water at a high constant head at the dam for power, and the canal water would divert some silt from entering the reservoir. It was proposed to have the upper reach of the canal of greater capacity to receive a larger fraction of the river water. In this reach partial settlement of silt was anticipated and the topmost clearer water was to spill over bank of canal to be stored in the reservoir, while the remainder, surcharged with silt, would pass down the canal. In the mind of another, such canal was to serve the further purpose of supplying water under good head for sluicing silt out of the reservoir when empty. At that time it was contemplated to have the reservoir empty quite often, for it was to hold only half of the expected annual flow, just to equalize the supply within an irrigation season. Were the reservoir empty each year during the three or four muddy months, only a quarter of the year's silt would be impounded.

13. Another writer proposed using canal water to operate hydraulic giants to be installed on projecting spurs to accomplish desilting, but only a small fraction of the reservoir could thus be reached.

14. The growing thought of larger storage for longer periods from times of plenty to years of drought makes the reservoir empty so seldom and for times so short that giants and ground sluicing could be at best but partial remedies.

15. Yet the thought of high-level marginal canal remains attractive partly because it would divert some silt and partly because it would provide during much of the time a higher and more constant head for generation of power than will the fluctuating reservoir waters. Considering only the hydraulics in the case, an improvement would be to make the canal several times as large, to carry even the smaller floods, and provide for escape of excess water with its silt into the lower end of the reservoir where the silt would be afterwards most

cheaply disposed of because of its nearness to the dam. Unfortunately, the topography alongside the San Carlos Reservoir site is so unfavorable that the canal, whether large or small, would be of prohibitive cost. Even were the canal more promising than it now seems, yet it would not be wise to load the present project with its cost, for it can as well be built at some future date, when the advisability of doing it may seem more clear and when the lands to be benefited have, through cultivation and through redemption of a portion of their debt, become better able to bear the cost.

16. Another plan thought of was to displace the canal by a large conduit on the floor of the valley, to extend from a feeding dam above through the storage dam below. The upper dam, though about equivalent to the diversion dam which the canal would require, would not be so far up the river by some 10 or 12 miles, for the conduit would not need to be longer than the reservoir. This conduit would carry the low-water flow of the river and a fraction of the flood waters, thus reducing the amount of silt which otherwise would enter the reservoir. In flood time the conduit, taking its water from the bottom of the stream where the percentage of silt is greatest, would convey as large a load of silt as could be at the time intrusted to the river bed below the storage dam. At other times the clearer conduit water would need to be fed en route or at the dam with additional silt from the reservoir, and during much of the year stored water, too, would need to be added, either in the conduit or at the dam, to supply the needs of irrigation. The conduit, fed from the river above, if throttled at the dam, could, if made large enough, supply for power purposes water with more head than the dam alone would furnish except when the reservoir is nearly full or the river above is low. But in the application of the above plan to the San Carlos Reservoir the drawbacks are so great as to prohibit its adoption. Among them are the following: (1) The conduit would be endangered by floods occurring when the reservoir is not full, for floods in the past have shifted the channel throughout the floor of the valley; (2) the conduit would be subject to pressures, internal and external, varying from zero at the upper end to that due to a head of 180 feet of water, or nearly 80 pounds per square inch near the dam, and sooner or later either would occur without the other to counterbalance it, as in case of full reservoir and empty conduit, or empty reservoir and full conduit, with its outlet closed or choked. Hence, great strength would be required, which, in connection with the necessary large size, would make it very costly; (3) the conduit with waters heavily silt laden is very liable to become choked like storm drains and dredge pipes, for it would not be practicable to regulate at all times the percentage of silt to enter it. Even with a small percentage of silt, choking would not be unlikely to occur at times when outlet is closed, for in practice there would be leakage past the gate, providing room for inflow of some waters with their silt, which latter would not escape but choke the conduit. Without looking at figures at all, the thought of a huge, strong, costly conduit, full of mud, and buried deep in silt and water compels one, when considering a great enduring project to be operated by everybody to want everything to be at all times within easy reach for correction and repairs.

17. Another proposed desilting plan consists of one or more conduits or sewers on the floor of the valley having outlet through the dam and having manholes or standpipes of varying heights thereon at chosen distances apart over the area to be operated on, together with a system of pipes consisting of a movable inclined suction pipe extending from the silt below to the water surface and flexibly connected there with a horizontal pipe of adjustable length borne by floating pontons, which latter pipe is connected by a 90° elbow with a vertical pipe capable of being revolved in its supporting bearings and projecting downwardly into the fixed standpipe or manhole to a considerable depth, thus constituting a siphon whose action is expected to transfer the silt with water from the bed of the reservoir into the sewer. The details include jet pipe extending down the suction pipe to loosen the silt when necessary and a means of air exhaustion to maintain the vacuum (or tendency thereto) at the summit of the system in the elbow over the standpipe, and, of course, a motor boat to haul the suction end of the plant around the circle of which the standpipe would be the center. The radius of action is proposed to be lengthened as required by inserting sections of pipe in the floating portion till the radius shall reach a half a mile or, as expected by some advocates, three-fourths of a mile to a mile.

18. To the writer the above plan in its application to the San Carlos Reservoir seems impracticable because of the following reasons:

(1) The submerged and buried conduits, with their standpipes, would be very costly. Besides, they would need to be installed before silting begins in order to have sufficient foundation and to be low enough to accommodate desilting to the depths desired. Such early installation—years before desilting needs to begin, according to present contemplated project, with the higher dam—means loss of years of interest on cost of unused plant. Moreover, the sewers during even the idle period would be subject to menace from floods, and somewhere or another there would likely be sufficient leaks to cause in so long a time a filling of the unused sewers with mud.

(2) To have a long ponton line with hauling boats, etc., attached to the standpipe would require in the latter much strength, particularly in case of winds, which are at times sudden and strong. Standpipes of sufficient lateral strength for such service would be very costly adjuncts to the very expensive sewers.

(3) The siphonage power relied upon to convey the water and silt from the suction head to the sewer would be insufficient for effective work except with pipe lines so short as to make the plan impracticable, through requiring a multiplicity of conduits and a forest of standpipes. The theoretical limit of power in the siphon would be only a vacuum which, in the altitude of San Carlos, would mean but 13.4 pounds per square inch, and, in general practice, considering inevitable leaks, still less pressure would be available. River and harbor dredging with pipe lines of a half a mile in length requires 10 to 15 inches vacuum on the suction, equivalent to 5 to 7½ pounds, and upwards of 25 pounds more on the discharge, making a total of over 30 pounds, which, by comparison, indicates the inadequacy of siphonage for similar work.

19. The only plan for desilting such a reservoir as the San Carlos, which has thus far come to mind as one certain of success at a cost not prohibitive, is dredging by modern methods and conveying the silt in vessels to the dam, thence to be borne by the effluent waters. Similar dredging and conveying have already been accomplished in Europe for less than 2 cents per cubic yard. While it is true that the cost of plant and labor would be higher at San Carlos, there are partly compensating conditions, such as absence of currents, excessive waves, and cold weather, and presence of cheap power to be developed at the dam, which could be applied to a portion of the work. It may be, too, that with travel through the Panama Canal the price of labor will go down. From all the investigations made it appears that 3 cents per cubic yard, exclusive of depreciation, is a safe estimate to apply to dredging silt in the quiet waters of the San Carlos Reservoir.

20. To judge whether desilting by dredging would be prohibitive in cost, let it be assumed as before that the mean annual flow at San Carlos is 346,568 acre-feet, and that the silt will amount to 1.3 per cent. These assumptions would make about 7,200,000 cubic yards per annum. But it is certain that a fraction of the silt would find its way through the dam without dredging, as would be the case with silt next the dam, and with silt along the water courses in times of flow through empty reservoir; thus probably reducing the required annual dredging to 6,000,000 cubic yards. If it shall be the practice to use water for irrigation so freely that the reservoir will be not infrequently empty, then a further reduction, perhaps to 5,000,000 if not to 4,000,000 cubic yards, would be cheaply accomplished by the plan proposed for the San Carlos Reservoir in the First Annual Report of the Reclamation Service, on page 82, which is to divert river water into temporary ditches to traverse the silt and convey it into the main channel to be carried through the dam. The discharge of silt from the reservoir should be nearly proportional to the discharge of waters, for otherwise there would be likelihood of raising the river bed below the dam, but the dumping of dredgings need not be absolutely continuous, for the escaping reservoir waters can be made to load themselves with silt if deposited within their reach. Considering that any dredge can be operated by either one, two, or three 8-hour shifts per day, thus making it possible for the output of the plant to be variable, in general keeping with the variableness of the amount of water to be discharged from the reservoir, it would be cheaper in first cost and more economical in operation to have two dredges of comparatively large capacity rather than, say, six dredges of one-third the capacity. The desilting plant would include the power plant at the dam, which can be installed at an earlier date if there be market for the power. In any event the design for the dam should include whatever may be afterwards necessary in the dam to accommodate the power plant. It would not be practicable to convey power by wire to the traveling plant, hence perhaps either compressed air or storage batteries would be used, conveyed to the plant in installments. Or the electric power may be put to other use, as pumping well water, and the proceeds applied to buying fuel for dredging.

21. The plant would cost not to exceed \$200,000 for the power plant at the dam and \$1,000,000 for the floating plant, including

accessories, or \$1,200,000 in all. The annual cost of desilting is therefore estimated to not exceed the following figures:

Interest and depreciation of plant, 10 per cent of \$1,200,000.....	\$120,000.00
Operating expenses, 6,000,000 cubic yards, at 3 cents.....	180,000.00
Total cost per annum.....	300,000.00
Yearly cost per acre (90,000 acres).....	3.33

It is to be remembered that power, which constitutes so large a part of operating expenses, would be provided either directly or indirectly by the water power at the dam, thus making the 3 cents a liberal estimate.

22. In this connection it should be borne in mind that the desilting account is to be credited with the cost of fertilizers, which in the absence of the river's silt the land would in time require.

23. It appears, therefore, that the silt problem is solved sufficiently for the purpose of the present report. It is probable that future discoveries and improvements, if not cheaper labor, will further lessen the cost. It is likely that Indian labor would be found efficient and advantageous for a portion of the work.

24. To make desilting an inseparable part of the project is a duty toward coming generations and the State. Were the cost proven to be for all time prohibitive, yet there would be no obligation to withhold the reservoir for another generation to use; for the people of to-day have as much right as those unborn to use a resource to its destruction. The duty is to protect resources that can be conserved, and it now appears that the San Carlos Reservoir can be put to use and satisfactorily conserved by methods already proven by experience, leaving untouched the field of future advancement to further simplify and cheapen the cost. The writer believes that coming generations will accomplish desilting for less per annum than a dollar per acre-foot of water used for irrigation, and that its cost will be largely if not fully offset by its value in maintaining the fertility of the soil.

D. E. HUGHES.

APPENDIX J.

GILA RIVER BETWEEN IMPOUNDING DAM AND DIVERSION DAM AS AN IRRIGATION CONDUIT.

1. The following quotation is taken from Water Supply Paper No. 33, pages 66-68:

San Carlos Reservoir site is located on Gila River, on the White Mountain Indian Reservation, at the San Carlos Agency, in Gila County, Ariz., at a point where San Carlos River joins the Gila. * * * The Gila River at this point traverses some spurs of the Pinal range of mountains, and for a distance of 31.5 miles below the dam site the river flows in a narrow box canyon. This canyon extends to Dudleyville, which point is the upper end of the Riverside Reservoir site. The river then passes through the Riverside Reservoir site for a distance of 15.5 miles, after which it again enters a canyon, which is the upper end of The Buttes Reservoir site. This latter canyon extends to the dikes, which is 4 miles above The Buttes Dam site. The total length of river from San Carlos Dam site to The Buttes Dam site is approximately 60 miles; about 40 miles of this distance being box canyon, and the remaining portion being valley land, of from 1 to 3 miles in width. (The San Pedro River enters the Gila at Dudleyville.) The water which is released from the San Carlos Reservoir site will pass through approximately 40 miles of box canyon on its way to the irrigable lands where it is to be used. Comparative measurements made at The Buttes and San Carlos during the dry season of the year, when less than 10 second-feet of water was flowing in the river at San Carlos, indicates practically an equal amount of water at San Carlos and The Buttes. There undoubtedly is a substantial loss from evaporation between these points, but this loss is compensated for by the seepage water which returns from the Riverside Valley and from the valley above The Buttes Dam site. In the case of the Riverside Valley a few second-feet of water is used for irrigation, and the return from this irrigation augments the stream. In both valleys, however, the high stages of the river undoubtedly charge the sand bars and gravel beds with water, and these are gradually drained off during the lower stages of the stream and, as has been stated, give practically an equal amount of water at San Carlos and The Buttes (at low stages). The San Pedro and the other drainage lines entering the Gila above The Buttes and below San Carlos will contribute their portion to this stream unregulated by a reservoir built at San Carlos. This water can be used for irrigation around Florence if diverted below. (That is, below The Buttes. The diversion sites are about 12 miles above Florence.) If this volume of water and the return water from seepage is added to the water which is discharged for irrigation from the San Carlos Reservoir site, it is probable that there will be available for irrigation at the point of diversion as much water as would be discharged from the San Carlos Reservoir site.

If the Gila River from the San Carlos Dam site to The Buttes Dam site is 60 miles in length and 200 feet in width it will expose to evaporation a water area of 1,454 acres. The depth of evaporation per annum has been previously determined as 91 inches, or 7.58 feet. With an area of 1,454 acres and a depth of evaporation of 7.58 feet, there will be lost from this body of water 11,021 acre-feet. This would be 4.6 per cent of the total capacity of the San Carlos Reservoir site (Lippincott was considering a dam 130 feet high, giving a reservoir capacity of 241,393 acre-feet) and, in order to make an allowance for all possible loss, 5 per cent of the water discharged from San Carlos is assumed as being lost for irrigation below The Buttes. The Riverside Valley and the valley above The Buttes are both largely public domain, and there is no reason why the water from the San Carlos Reservoir should not be used for irrigation purposes at these points, as well as below Florence. This being the case, there will be but a slight disadvantage in storing water at San Carlos. (Water-Supply Paper No. 33, pp. 66-68.)

2. Following the above is a table showing the behavior of the San Carlos Reservoir during an "average" year. In that table a loss in

transmission of 5 per cent is allowed for. It would appear to be unnecessary to make this allowance, if as claimed above, the loss from evaporation is "compensated for by the seepage water which returns from the Riverside Valley and from the valley above The Buttes Dam site."

3. Under the head of "Gila River as an Irrigation Conduit," Mr. J. D. Schuyler (S. Doc. 152, 56th Cong., 1st sess.) comments as follows:

The possible losses by evaporation and infiltration in the 60 miles of river channel below San Carlos have not been overlooked in this investigation, and the canyon was carefully examined at low water between San Carlos and The Buttes. It was found that the flow of the stream was practically undiminished all the way down, and that while loss from evaporation was considerable it was about balanced by the underflow or seepage coming in from the tributary drainage area between these points. The subject is intelligently discussed in Mr. Lippincott's report and the conclusion is reached that for all practical purposes there are no disadvantages in storing the water supply at San Carlos, 60 miles above The Buttes, and no more loss of water to be anticipated than if the reservoir were located at The Buttes. Also that the flood discharge of the stream below San Carlos will be available for diversion below The Buttes during a portion of the year, and when such diversion is thus made the storage at San Carlos need not be drawn upon, which will increase the duty of the San Carlos Reservoir. These conclusions are fully concurred in by the writer as sound and well based.

4. This board is of the opinion that there is little or no loss in the canyon portions of the stream, except from evaporation. This latter loss may be wholly compensated for by inflow from springs, of which many are reported to exist, and from side drainage. The elevation of the canyon bed from Dudleyville to San Carlos increases from about 1,700 feet to 2,300 feet. Within short distances of the canyons the mountains rise to heights of more than 4,000 feet, and receive an annual rainfall that averages more than 15 inches.

5. Loss from filtration can occur only in the "valley lands," described by Lippincott as about 20 miles in length and from 1 to 2 miles in width.

6. It was pointed out in Water-Supply Paper No. 33 that on the average in the present unregulated condition of the river any losses sustained from filtration or evaporation between San Carlos and the mouth of the San Pedro are more than made up by the supply contributed by the San Pedro, and that in fact the run-off of the Gila just below the mouth of the San Pedro averages 11 per cent greater than the run-off at San Carlos. Observations taken since Paper No. 33 was published confirm this figure. (See Appendix F.)

7. It was also stated (p. 67) that "Comparative measurements made at The Buttes and San Carlos during the dry season of the year, when less than 10 second-feet of water was flowing in the river at San Carlos, indicate practically an equal amount of water at San Carlos and The Buttes." There are no subsequent observations on record that either confirm or throw doubt on this statement, but it is felt that only by a long series of observations could its truth be established beyond peradventure. But whether or not during the dry season there is a net loss between San Carlos and The Buttes, the fact is that for the average year the quantity of water passing The Buttes is greater than that passing San Carlos.

8. The question is, Will this condition obtain in the case of a regulated flow of the Gila through the impounding dam? Can it be assumed that there may be diverted into the canal 11 per cent more water than is passed through the impounding dam? On the

basis of a yearly draft from the reservoir of 200,000 acre-feet, the flow through the dam would vary between 200 and 367 second-feet, depending upon the season of the year.

9. During the period of high water and for some time thereafter, when, even though no water had been wasted over the spillway of the impounding dam, the flow of the San Pedro and of the small tributaries above Dudleyville would probably have filled up the gravels below Dudleyville, it is easy to believe that a given small flow released from the reservoir would reach the diversion dam un-reduced or even augmented in quantity. The diversion dam also may bring to the surface a small quantity of underflow. But at the end of a long dry season, when the gravels may be drained and the San Pedro dry, it might be necessary to release from the reservoir a greater quantity of water than is needed at the intake for irrigation. It should not be overlooked also that possibly the flood discharge of the San Pedro may exceed for brief periods the capacity of the main canal and that accordingly a certain quantity of water may go to waste over the diversion dam. But even with these losses, Schuyler's opinion seems sound that with the regulated stream, the gain between the two dams will on the average exceed the loss, and that "the flood discharge of the streams below San Carlos will be available for diversion below The Buttes during a portion of the year, and when such diversion is thus made, storage at San Carlos need not be drawn upon, which will increase the duty of the San Carlos reservoir."

10. Assuming, then, a system of communications between observers on the San Pedro and the dam authorities, the flow through the dam may be reduced or even shut off entirely, depending upon the quantity flowing in the San Pedro. The four available hydrographs of the San Pedro (two of them partial) indicate that floods may be expected in July, August, and September, and this inference is borne out by rainfall records extending over a long period of years. This is also the season of greatest rainfall on the irrigable area near Florence. The practical way to profit by the San Pedro floods would be to shut the gates in the dam during the flood season except when the flood flow of the San Pedro is exceptionally low.

11. While, therefore, one would probably be justified in counting upon the San Pedro for some water, it would be impossible from the data at present available to estimate its amount. It will therefore merely be assumed that the water released from the impounding dam sustains no loss. This conservatism seems all the more wise when it is realized that not all of the drainage area of the San Pedro is in the United States and that possibly the flow in Mexico may some day be diverted.

C. H. MCKINSTRY.

APPENDIX K.

UNIVERSITY OF ARIZONA,
AGRICULTURAL EXPERIMENT STATION,
Tucson, Ariz., July 29, 1913.

Lieut. Col. C. H. MCKINSTREY,
Board of Army Engineers, Los Angeles, Cal.

DEAR SIR: I have yours of July 18 relative to a report upon soils of the Casa Grande Valley and their irrigation with well water and with river water. Being somewhat familiar with this region and having a quantity of material on hand relating to the points you mention, I submit it herewith, in order, if possible, to save time both to you and to me in this connection.

In general, the soils of the Casa Grande Valley are exceedingly well graded naturally, entailing minimum expense in leveling for irrigation. They range in physical character from gravelly loams, at higher elevations, to somewhat heavy clays, usually in the valley bottoms. In a general way it may be stated that in physical disposition and character the soils of Casa Grande Valley resemble those of the Salt River Valley.

With reference to alkali content, I am inclosing a sheet of analyses,¹ together with accompanying map,² showing location of a number of the samples tabulated. As is shown on the sheet, nearly all of the soils examined are more or less black alkaline in character, most of the samples representing 1 foot of soil. In a few cases only the salts are shown to contain an excess of calcium sulphate.

Accepting a common statement to the effect that 0.1 per cent of black alkali in a soil is likely, in the course of time, to prove injurious to most farm crops, it will be seen that this limit is occasionally exceeded, but that in the majority of cases the amount of black alkali contained is much less than 0.1 of a per cent. Under the influence of irrigation and without precautionary measures, such as thorough cultivation, etc., black alkali and other soluble salts may be concentrated from several feet in depth at or near the surface, thus increasing percentages of black alkali which may originally exist in virgin soils within reach of plant roots.

On the other hand, valuable lands threatened with injury by black alkali may be treated with gypsum, which is an antidote for sodium carbonate, or black alkali, in the soil. We have treated such lands at Tucson with gypsum obtained in carload lots at Douglas, Ariz., at an expense of \$2.50 a ton laid down at Tucson. The treatment has proven practicable and economic with us under those conditions. Of course the amount of gypsum required varies with the quantity of black alkali in a stated soil.

Therefore it may be stated that while small but noteworthy amounts of black alkali generally prevail in the district, they are manageable or can be remedied.

If further evidence is needed the crops grown in the valley, some of them on farms of long standing, should complete the proof.

With reference to the water supply for the district. This may be classified under three heads:

1. Well waters.
2. Flood waters.
3. (Prospective) Reservoir waters.

With reference to well waters, we are submitting two sheets³ containing analytical figures for samples taken throughout the district. As may be seen, those waters obtained at a distance from the Gila River are usually more or less black alkaline in character. Quite a number will be seen to exceed the limit of 10 parts in 100,000, which we assume to be a noteworthy and sometimes harmful amount of black alkali in an irrigation water. For instance, No. 5130 contains a prohibitive amount of black alkali and No. 3903 is seriously black alkaline.

On the other hand, the waters near the Gila River, shown mainly on sheet 2, are for the most part white alkaline in character, containing an excess of calcium sulphate. The waters containing white alkaline salts may be seen to average a larger quantity of total solids than the black alkali waters, although this statement does not hold true in all cases. Assuming that 100 parts of total solids, white alkaline in character, may prove injurious, quite a number of the white alkaline waters may be seen to contain noteworthy quantities of soluble salts considered from an irrigator's point of view;

¹ Sheet marked "Inclosure No. 1," following this letter.

² Map marked "Inclosure No. 2," following this letter.

³ Sheets marked "Inclosure No. 3" and "Inclosure No. 4" follow this letter.

for instance, No. 3596 is prohibitively white alkaline and Nos. 5108, 5143, and 5163 are seriously white alkaline. Sometimes in irrigating with well waters it is possible to mix black alkaline and white alkaline waters in such a way that the resulting mixture is harmless. In this connection, please see pages 698, 699, and 700 of our twenty-third annual report,¹ herewith sent you. Considered as a whole, the Casa Grande district and the Gila River district adjoining contain a great variety of well waters, some of them excessively black alkaline, others excessively white alkaline, but in many instances entirely acceptable for irrigating purposes, and in many more instances not far from a point where their ultimate effects upon irrigated lands is somewhat debatable.

It is to be remarked in this connection that the evidence is accumulating to indicate that deep wells in the district are likely to average better in quality than surface wells; for instance, compare Nos. 5143 and 5144. The first-named shallow well contains 354 parts of soluble solids. The second water stratum in the same well contained only 80 parts in 100,000.

With reference to flood waters available from the Gila River, the Santa Cruz, and other tributary valleys, I will call attention to the character of these waters as shown in section 1, Table VIII,² page 192, Bulletin 44, herewith sent you. As shown in this table the flood waters of the Gila River (and the same is true of Salt River and I think of floods generally in Arizona) are black alkaline in character. In the table flood waters for six weeks during the period of observation contained 3.66 to 6.66 parts of black alkali in 100,000 of water. This is not a prohibitive amount, but when added to a soil of black alkaline in character might, in some cases, aggravate an existing tendency. In other cases where soils contain an excess of white alkali, as is shown in several instances on the sheets submitted, the excess of calcium sulphate in the soil and the black alkali in the flood water would neutralize each other. The practical outcome, however, of the use of these flood waters in the district would not be injurious, for the reason that their abundance would result in so flooding and draining the soil as in the average instance to benefit rather than harm it in so far as the black alkali content mentioned is concerned.

With reference to reservoir waters, I will again call attention to section 1, Table VIII,³ in Bulletin 44, in which you will see that the low waters of the Gila River contain an excess of calcium sulphate. In a reservoir the black alkali of the flood waters would be neutralized by the calcium sulphate of the low waters and the character of the general river flow thereby be improved for irrigation. This is supported by observations made on the Salt River which, as shown in section 1, Table IV,³ page 174, Bulletin 44, is also black alkaline in flood, although in the case of that table the floods and the low waters were not so sharply divided as in the case of the Gila. In October, 1911, a sample of the mixed waters of the Salt River, as obtained from the irrigating outlet of Roosevelt Reservoir, contained an excess of 1.6 parts in 100,000 of calcium sulphate. Inasmuch as the Salt and Gila Rivers are similar in their chemical composition, there is reason to believe that a large reservoir upon the Gila River would have similar effect upon irrigating waters contained.

Summing up, therefore:

1. The soils of the Casa Grande Valley are physically desirable, but, generally speaking, contain noticeable, and sometimes serious, amounts of black alkali which it would be well to consider in general measures affecting the welfare of the district.

2. The well waters vary greatly in character, those along the Gila River being for the most part white alkaline in character, while those at a distance from the Gila River are for the most part black alkaline in character. A number of instances are observed where either black or white alkalies are contained in injurious excess; in other cases they are contained in dubious amount, and in yet other cases they are not contained in any damaging quantity. In cases of a large general development of the ground waters of the district through single or harmonious agencies, these waters should be so combined in irrigating that sodium carbonate and calcium sulphate contained may react in a manner improving the quality of the water.

3. In the case of river waters, the black alkaline flood waters and the calcium sulphate low flow, more especially of the Gila River, will unquestionably benefit by mixture in a storage reservoir.

4. Aside from discussions more or less theoretical in character, the history of the district for the last 20 years shows that for the most part wherever abundant irrigating water is available large and profitable crops may be grown.

I hope these statements will prove sufficient for your purpose, and remain,

Very respectfully,

B. H. FORBES, Director.

¹ Extracts referred to, marked "Inclosure No. 5," follow this letter.

² Table VIII, marked "Inclosure No. 6," follows this letter.

³ Table IV, marked "Inclosure No. 7," follows this letter.

[Inclosure No. 1, with letter of Prof. R. H. Forbes, July 29, 1913.]

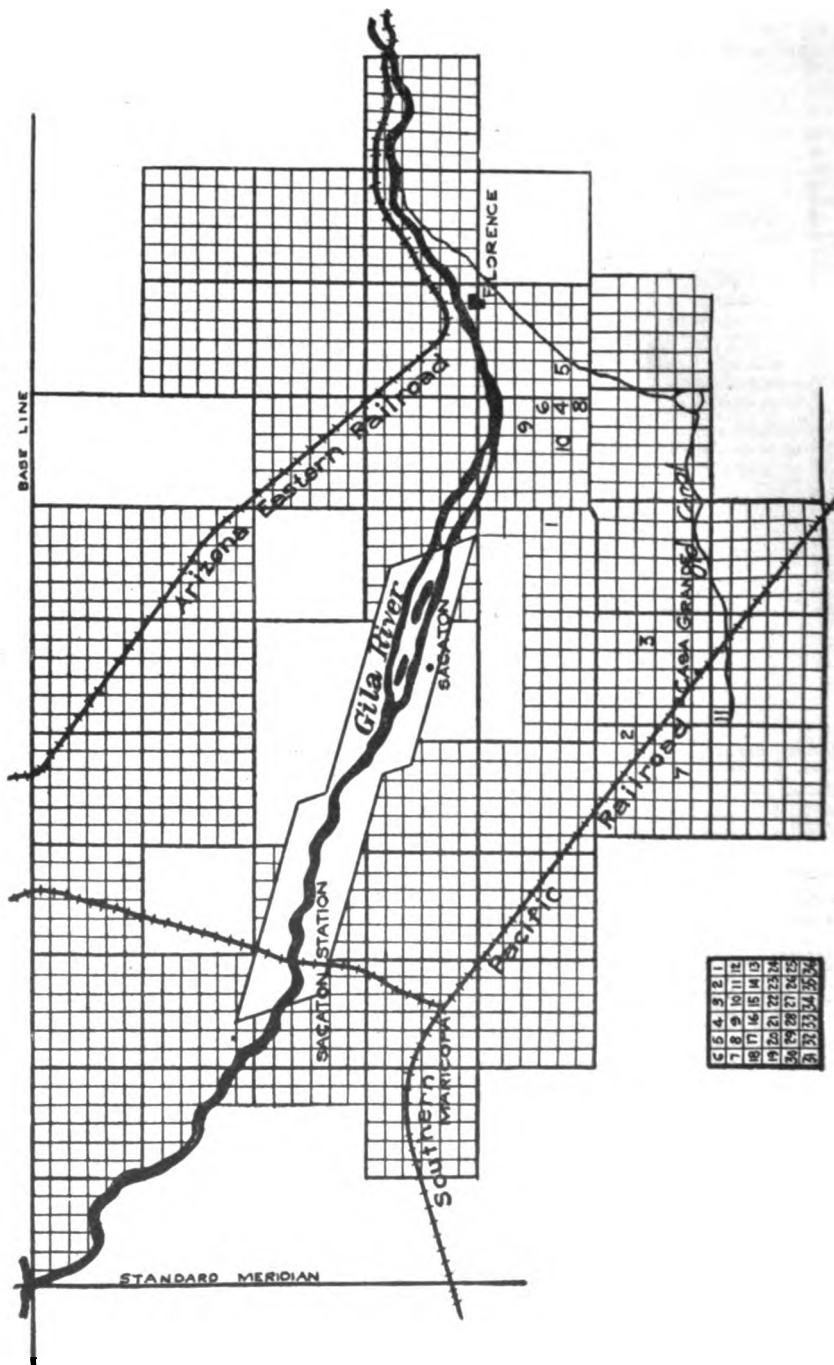
Soils from Casa Grande district.

Laboratory No.	Date.	Depth.	Total solids.	Chlorides.	CaSO ₄ .	(Black alkali) Na ₂ CO ₃ .
			<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
4988	July 5, 1912		0.888	0.16		0.127
4989	do		.40	.04		.068
4990	July 5, 1910		.49	.894		.102
4991	Oct. 25, 1912		.29	.026		.102
4992	do		.54	.146		.042
4993	do		.38	.116		.042
4994	Jan. 3, 1913		.352	.004		.186
4995	do		.152	.004		.119
4996	Feb. 6, 1912	18 inches	.428	.06		.017
4997	do	do	.20	.012		.008
4998	do	Horizontal section	.14	.004	0.011	
4999	do	18 inches	.344	.016		.017
5000	do	Horizontal section	.148	.004	3.065	
5001	do	18 inches	.156	.004	.044	
5002	do	5-foot perpendicular section	.224	.004		.008
5003	do	18 inches	.136	.004		.017
5004	do	do	.24	.032	.022	
5005	Mar. 31, 1913	First foot	.124	.008		.008
5006	do	do	.196	.008		.034
5007	Apr. 12, 1913	do	.122	.004		.017
5008	do	Second foot	.148	.004		.017
5009	do	do	1.294	.44		.034
5010	do	Top 6 inches	.176	.036		.008
5011	do	First foot	.262	.008		.042
5012	do	Second foot	.576	.36		.085
5013	June 14, 1913		.328	.124	.062	
5014	do		.148	.008	.044	
5015	do		.860	.544	.305	
5016	do		.868	.30	.326	
5017	July 9, 1913		.216	.004		.042
5018	do		.156	.004		.017

Location.

Index No.	Sample No.	Owner.	Description.
1	4998	Chas. G. Henck	Sec. 24, 5 S., 7 E.
	4999	do	
2	4990	do	
	4998	W. F. Christman	W. 1/2 SW. 1/4 sec. 12, south.
	4999	do	T. 6 S., R. 5 E., middle.
	4970	do	In arroyo, north.
3	5043	F. J. Cornick	Sec. 14, 6 S., 6 E., Santa Cruz ridge.
	5044	do	
4	5077	Will E. Ryan	NE. 1/4 sec. 25, 5 S., 8 E.
	5078	do	S. 1/2 NE. 1/4 sec. 29, 5 S., 9 E.
	5079	do	SE. 1/4 sec. 24, 5 S., 8 E.
	5080	do	NE. 1/4 sec. 25, 5 S., 8 E.
	5081	do	Sec. 36, 6 S., 8 E.
	5082	do	Sec. 36, 6 S., 8 E.
	5083	do	SE. 1/4 sec. 24, 5 S., 8 E.
	5084	do	S. 1/2 NE. 1/4 sec. 29, 5 S., 9 E.
	5085	do	S. 1/2 NE. 1/4 sec. 29, 5 S., 9 E.
7	5139	Dr. Meserve	W. 1/2 NW. 1/4 sec. 27, 5 E., 6 S.
	5140	do	E. 1/2 sec. 27, 5 E., 6 S.
9	5145	Dr. Vinson	NE. 1/4 sec. 14, 5 S., 8 E.
	5146	do	NE. 1/4 sec. 14, 5 S., 8 E.
10	5147	do	SW. 1/4 sec. 27, SE. cor. 5 S. 8 E.
	5148	do	SW. 1/4 sec. 27, SE. cor. 5 S. 8 E.
	5149	do	SW. 1/4 sec. 27, 5 S., 8 E., west side.
	5150	do	SW. 1/4 sec. 27, 5 S., 8 E., west side.
11	5220	Fred Harm	SE. 1/4 SE. 1/4 sec. 6, 7 S., 6 E.
	5221	do	SW. 1/4 SE. 1/4 sec. 6, 7 S., 6 E.
	5222	do	NW. 1/4 SE. 1/4 sec. 6, 7 S., 6 E.
	5223	do	NE. 1/4 SE. 1/4 sec. 6, 7 S., 6 E.
	5224	Mrs. S. R. Bond	

INCLOSURE No 2



[Inclosure No. 3, with letter of Prof. R. H. Forbes, July 20, 1913.]

Water analysis of Casa Grande District.

Laboratory No.	Date.	Depth.	Total solids.	NaCl.	CaSO ₄ .	Ca (HCO ₃) ₂ .	Na ₂ CO ₃ .	Qualitative.		
								SO ₄ .	Mg.	Ca.
		<i>Feet.</i>								
4267	June 10, 1910		128.8	56.8			14.0	S.	MS.	M.
4268	do.		44.4	6.0			11.0	M.	MS.	Sl.
4269	do.		36.0	3.4			4.2	M.	M.	Sl.
3003	July 2, 1908		94.6	27.9			26.7	Sl.	S.	Sl.
4278	July 11, 1910		79.4	8.8			9.3	S.	M.	M.
4918	Mar. 8, 1912		267.6	106.4		27.9	9.1	VS.	VSl.	M.
4958	Oct. 16, 1912		59.2	10.8		27.7	1.7	M.	Sl.	M.
4957	Oct. 9, 1912		41.4	4.0		24.3	9.7	M.	VSl.	Sl.
4661	Oct. 3, 1912		228.6	102.2	116.4	14.6		VS.	S.	VS.
3015	Dec. 14, 1912		130.0	93.8	21.7	22.1		MS.	S.	MS.
3016	do.		135.0	80.0	17.4	23.9		MS.	S.	MS.
3074	Feb. 6, 1913		42.8	4.8		27.5	1.1	M.	Sl.	MS.
3075	Feb. 7, 1913		145.2	80.6	17.4	32.8		S.	M.	S.
3108	Feb. 28, 1913		206.6	62.0	1.6	26.3		MS.	Sl.	MS.
3115	Mar. 10, 1913		61.8	24.6		5.5		M.		
3227	Mar. 26, 1913		95.6	46.4	16.8	32.0		Sl.	Sl.	M.
3228	Jan. 2, 1913	46	36.2	3.0		32.4	8.0	M.	Sl.	M.
3229	do.	26	37.4	3.2		24.0	3.2	M.	Sl.	M.
3130	Mar. 25, 1913		265.0	60.6		100.6	107.7	S.	Sl.	Sl.
3141	Mar. 31, 1913		63.8	10.3		32.5	3.6	MS.	Sl.	M.
3142	Apr. 9, 1913		127.8	61.0	21.2	32.3		MS.	VS.	VS.
3143	do.		354.2	197.0	109.9	24.8		S.	MS.	MS.
3144	do.	113	80.4	33.0	14.7	27.5		MS.	Sl.	M.
3153	Apr. 15, 1913	105	289.6	117.6	6.5	36.4		VS.	Sl.	M.
4967	Oct. 24, 1912	151-178	39.6	9.6		19.4	1.7	M.	Sl.	M.
5196	May 7, 1913		30.6	6.6		10.8	5.5	M.	Sl.	VSl.
5197	do.		35.9	5.2	.8	23.0		M.	Sl.	M.

Laboratory No.	Owner.	Description.
4267	Geo. S. Williams	NE. $\frac{1}{2}$ sec. 11, 6 S. 5 E.
4268	C. L. Sharo	
4269	S. J. Garrett	2 miles north of Casa Grande.
3003	H. D. Wilson	25 miles south (mine shaft).
4278	S. J. Garrett	$\frac{1}{2}$ mile below No. 4269.
4818	S. G. Leonard	Sec. 11, 6 S. 5 E.
4958	F. L. Potts	Sec. 11, 6 S. 5 E.
4957	W. F. Christman	Sec. 12, 6 S. 5 E.
4661	H. H. Freeman	Near Florence.
5015	F. G. White	Gila River below Hayden.
5016	F. G. White	Gila River above Winkleman.
5074	Chas. G. Houck	Sec. 34, 6 S. 7 E.
5075	Will E. Ryan	7 miles below Florence (head of Pima lateral).
6108	C. C. Cramer	NE. $\frac{1}{2}$ sec. 11, 6 S. 5 E.
5115	S. T. Moore	6 miles west of Casa Grande.
5127	A. L. Enger	Railroad well at Florence.
5028	Chas. Terhune	14 miles east of Casa Grande.
5029	S. J. Garrett	2 miles north of Casa Grande.
5130	O. G. Magee	Sec. 12, 6 S. 5 E.
5141	Dr. Meserve	(Bennet's well) NE. cor. NE. $\frac{1}{2}$ sec. 22, 5 E., R. 6 S.
5142	A. E. Vinson	Casa Grande Ruins, Blackwater.
5143	A. E. Vinson	F. E. Carpenter old well, NW. $\frac{1}{2}$ sec. 35, 6 S. 8 E.
5144	A. E. Vinson	F. E. Carpenter old well (second stratum).
5153	C. C. Cramer	NE. $\frac{1}{2}$ sec. 11, 6 S. 5 E.
4967	W. F. Christman	Well, sec. 30, T. 6 S., R. 5 E.
5196	John B. Cline	Well of W. R. Smith.
5197	John B. Cline	Well.

[Enclosure No. 4, with letter of Prof. R. H. Forbes, July 29, 1913.]

Water analyses.

Laboratory No.	Date.	Depth.	Total solids.	NaCl.	CaSO ₄ .	Ca (HCO ₃) ₂ .	Na ₂ CO ₃ .	Qualitative.		
								SO ₄ .	Mg.	Ca.
		<i>Feet.</i>								
3248.....	Mar. 26, 1904	.....	68.0	28.8	.....	.....	2.9	M.	S.	S.
3594.....	May 17, 1906	.....	86.8	40.0	.....	.....	.....	M.	M.	S.
3598.....	.....	.....	378.8	76.0	.....	.....	84.8	VS.	VS.	VS.
3599.....	.....	.....	1,062.8	780.0	127.3	.....	.....	S.	VS.	VS.
3597.....	.....	.....	408.4	269.0	.....	.....	13.1	S.	S.	S.
3598.....	.....	.....	130.0	74.5	18.0	.....	.....	M.	S.	S.
3599.....	.....	.....	42.8	22.4	0.5	.....	.....	VS.	M.	M.
3600.....	.....	.....	258.2	170.0	13.6	.....	.....	S.	S.	S.
3694.....	.....	.....	461.8	324.0	99.0	.....	.....	S.	S.	VS.
3692.....	.....	.....	273.0	179.5	.....	.....	66.1	VS.	SI.	SI.
4189.....	Dec. 8, 1909	.....	160.8	86.0	22.8	.....	.....	M.	VS.	M.
4180.....	.....	.....	145.0	74.1	29.4	.....	.....	M.	M.	M.
4161.....	.....	.....	113.2	54.8	14.7	.....	.....	M.	M.	M.
4162.....	.....	.....	117.0	56.8	17.4	.....	.....	M.	M.	M.
4163.....	.....	.....	70.4	33.2	1.1	.....	.....	M.	SI.	M.
4164.....	.....	.....	140.4	72.0	17.9	.....	.....	S.	M.	M.
4165.....	.....	.....	69.4	32.6	4.9	.....	.....	M.	SI.	SI.
4166.....	.....	.....	151.8	81.0	21.7	.....	.....	S.	S.	S.
4167.....	.....	.....	179.0	99.6	19.6	.....	.....	M.	S.	M.
4168.....	.....	.....	154.0	83.0	14.7	.....	.....	M.	S.	S.
4180.....	Jan. 17, 1912	.....	109.6	54.2	16.3	49.1	.....	MS.	S.	MS.
4181.....	.....	.....	108.4	54.4	14.7	40.1	.....	MS.	S.	MS.
4187.....	Jan. 20, 1910	82	74.6	36.3	4.9	.....	.....	M.	S.	M.
4186.....	.....	48	106.2	52.1	13.6	.....	.....	S.	S.	S.
4189.....	.....	29	106.2	52.1	13.6	.....	.....	S.	S.	S.
4190.....	.....	43	106.2	52.1	13.6	.....	.....	S.	S.	S.
4352.....	Nov. 5, 1910	.....	67.8	28.6	20.7	.....	.....	M.	MS.	MS.
4701.....	Sept. 25, 1911	.....	172.2	93.6	29.4	41.1	.....	S.	M.	S.
4705.....	Oct. 20, 1911	.....	97.4	48.0	15.2	40.1	.....	MS.	MS.	S.
4706.....	.....	.....	98.6	48.6	15.2	40.3	.....	MS.	MS.	S.
4707.....	.....	.....	110.4	53.8	8.2	42.9	.....	MS.	MS.	S.
4708.....	.....	.....	111.4	54.7	7.6	43.3	.....	MS.	MS.	S.
4709.....	.....	.....	110.0	56.2	16.8	39.5	.....	MS.	MS.	S.
4710.....	.....	.....	120.4	56.6	16.3	38.7	.....	MS.	MS.	S.
4711.....	.....	.....	105.6	52.1	13.6	38.5	.....	MS.	MS.	S.
4712.....	Oct. 21, 1911	.....	107.6	53.8	13.1	39.1	.....	MS.	MS.	S.
4713.....	.....	.....	108.0	52.6	16.8	39.7	.....	MS.	MS.	S.
4714.....	.....	.....	100.0	53.2	7.6	29.5	.....	MS.	MS.	S.
4715.....	.....	.....	147.8	76.0	25.0	44.3	.....	S.	MS.	S.
4716.....	.....	.....	152.0	76.9	30.4	44.1	.....	S.	MS.	S.
4717.....	.....	.....	132.8	69.0	27.2	40.5	.....	S.	MS.	S.
4718.....	.....	.....	134.4	69.5	26.1	40.7	.....	S.	MS.	S.
4782.....	Jan. 18, 1912	.....	96.4	56.4	4.3	33.2	.....	MS.	S.	M.
4783.....	.....	.....	110.6	58.5	13.0	38.1	.....	MS.	S.	MS.
4784.....	.....	.....	134.4	75.4	31.5	36.2	.....	MS.	S.	MS.
4785.....	.....	.....	111.0	57.0	16.3	38.1	.....	MS.	S.	MS.
4786.....	.....	.....	111.0	57.0	16.3	38.1	.....	MS.	S.	MS.

VS.=very strong; S.=strong; MS.=moderately strong; M.=moderate; SI.=slight.

Laboratory No.	Gila River below Florence.
3248	Sacaton. W. H. Cody.
3304	Sacaton. C. H. Cook, Government well
3505	Papago Village, 6 miles S.E. of Sacaton.
3506	Blackwater ridge, 11 miles S.E. of Sacaton.
3597	Blackwater, north of river.
3598	Stotonic Village, 7 miles N.W. of Sacaton.
3599	Hanson's farm well
3699	Mas akimuri (born the river).
3691	Lower Schomick (water village), 13 miles below.
3692	Gila Crossing Village (30 miles west of Sacaton).
4159	Sacaton, Indian well, farthest east.
4160	Sacaton, Hugh Patten's well.
4161	Sacaton, Indian well.
4162	Do.
4163	Sacaton, Indian well, Hirschute Chrk.
4164	Sacaton, big well.
4165	Sacaton, electric power house.
4166	Sacaton, Indian well.
4167	Sacaton, Indian well, farthest west.
4168	Sacaton, Government well.
4180	Jay D. Stannard, Santan Canal, No. 1.
4181	Jay D. Stannard, Santan Canal, No. 2.
4187	Gila Indian Reservation. J. D. Stannard, well No. 4.
4188	Do.
4189	Gila Indian Reservation. J. D. Stannard, well No. 5.
4190	Do.
4392	J. D. Stannard, sec. 24, 1 S., 5 E.
4701	J. D. Stannard, Sacaton Reservation, No. 9.
4705	J. D. Stannard, Gila Indian Reservation, well No. 1.
4706	J. D. Stannard, Gila Indian ditch water.
4707	J. D. Stannard, Gila Indian well No. 2.
4708	J. D. Stannard, Gila Indian ditch water No. 2.
4709	J. D. Stannard, Gila Indian well No. 4.
4710	J. D. Stannard, Gila Indian ditch water well No. 4.
4711	J. D. Stannard, Gila Indian well No. 5.
4712	J. D. Stannard, Gila Indian ditch water No. 5.
4713	J. D. Stannard, Gila Indian well No. 6.
4714	J. D. Stannard, Gila Indian ditch water No. 6.
4715	J. D. Stannard, Gila Indian well No. 7.
4716	J. D. Stannard, Gila Indian ditch water No. 7.
4717	J. D. Stannard, Gila Indian well No. 8.
4718	J. D. Stannard, Gila Indian ditch water from No. 8.
4732	J. D. Stannard, flat through which Santa Cruz flows.
4733	J. D. Stannard, seepage from Blackwater Pond.
4784	J. D. Stannard, seepage from Little Gila, 4 1/2 miles below Sacaton.
4785	J. D. Stannard, Santan Canal, 12 miles below head.
4786	Do.

[Inclosure No. 5, with letter of Prof. R. H. Forbes, July 29, 1913. Extract from pages 698, 699, and 700 Twenty-third Annual Report, University of Arizona, Agricultural Experiment Station.]

OBSERVATIONS OF THE CLOSE PROXIMITY OF BLACK ALKALINE AND CALCIUM SULPHATE WATERS.

Black alkali is of common occurrence in waters received at this laboratory; and frequently the chemists are obliged to report such waters unfavorably, although otherwise they would serve very well for irrigating purposes. Thus, each acre-foot of an irrigation water carrying 10 parts of black alkali per 100,000 will add 272 pounds of sodium carbonate to the soil on which it is used. It is also known that most crops do not thrive on soil containing more than 0.10 per cent (equivalent to 4,000 pounds in the first acre-foot) of this form of alkali. Since sodium carbonate is difficult to leach out of the soil, and since the conditions under which these waters are used often preclude the application of large amounts for leaching purposes, it may easily happen that most of the black alkali would remain concentrated in the upper stratum of soil. Under these conditions, and assuming that the land was originally neutral, we find that the limit of tolerance would be reached in a very short time, depending chiefly upon the depth of water applied to the land each year. Thus, in average practice serious injury might occur easily before the end of 10 years. If, however, calcium sulphate or gypsum is applied to the land or mixed with the water, a reaction will occur in which the injurious sodium carbonate, by combining with the gypsum, will be changed to the much less injurious sodium sulphate and inert calcium carbonate. The tolerance of crops for sodium sulphate is not only five times as great as for black alkali, but sodium sulphate clings much less tenaciously to the soil, and therefore may be leached out much more easily.

Occasionally waters of opposite character capable of reacting in this way are met in successive water-bearing strata in the same well, but during the past year several very interesting instances of calcium sulphate waters occurring in close proximity to black alkaline waters have come to our notice. The composition of several of these is stated in the following table:

Composition of closely associated calcium sulphate and black alkaline waters.

	Laboratory No.—							
	4793	4794	4795	4801	4802	4986	4987	5003
Total solids at 110° C.....	17.6	39.6	135.4	119.6	114.4	62.0	48.6	175.6
Chlorides as sodium chloride.....	1.0	14.8	81.6	6.9	5.7	2.8	3.6	80.8
Permanent hardness as calcium sulphate.....			19.6	4.1			6.5	
Temporary hardness as calcium bicarbonate.....	3.2	8.1	14.6	63.2	60.5	47.0	35.6	84.8
Alkalinity as sodium carbonate.....	8.5	6.36			.85	10.2		8.5

The first three analyses in this table are of waters encountered by Director Forbes in examining the source of supply for a small irrigation project at Bear Springs, about 6 miles above Fairview in Graham County. A simple calculation shows that water 4793 from the east well in the project carries 231 pounds of sodium carbonate in an acre-foot, and that if 3 acre-feet were used annually, in 10 years 6,941 pounds, or 0.17 per cent of black alkali for the first acre-foot of soil would be added to the land. Similarly, water 4794 from the middle well would add 5,172 pounds, or 0.13 per cent, of black alkali for the first acre-foot. Water 4795 from the west well, however, is rich in calcium sulphate, the natural antidote for black alkali, amounting to 416 pounds in the acre-foot and capable of neutralizing water 4793 when mixed in the ratio 1 to 1.8, and of neutralizing water 4794 in the ratio 1 to 2.4. An interesting feature in this case is that while the water from the west well (4795) is available to correct the alkalinity of the other two, of itself it would prove rather unsatisfactory, due to its large salt content. The two black alkaline waters on the other hand are unusually low in harmful salts other than sodium carbonate. Consequently, the neutral water resulting from mixing 4795 and 4793 in the ratio 1 to 1.8 will contain 59.7 parts per 100,000 of dissolved solids, and that from mixing 4795 with 4794 in the ratio 1 to 2.4 will contain 67.7 parts, in either case producing very satisfactory irrigating waters.

Waters 4801 and 4802 are from wells about 600 feet apart in the Santa Cruz Valley near Tucson. The amount of black alkali in the one is not large enough to interfere seriously with its use. These waters illustrate the possibility of finding adjacent sources of entirely different composition. The fairly high percentage of dissolved solids in these two waters, which ordinarily would raise some question as to their effect after long continued use, represent an unusually large amount of harmless calcium bicarbonate, and the remaining dissolved material is mostly sodium sulphate, the least harmful form of white alkali.

Waters 4986 and 4987 are from opposite sides of the Santa Cruz underflow at the San Xavier Indian Agency. Both these waters are excellent, in that the solids are mostly calcium bicarbonate, and their salt content very low; but the black alkali in 4986 would eventually prove disastrous if used alone. If, however, the two waters are blended in the ratio 1 of 4986 to 2 of 4987, a neutral water of satisfactory composition will result.

The remaining water (5003) is from a bayou of the Colorado River, and is interesting from the fact that it is black alkaline, whereas the Colorado normally contains calcium sulphate. The water is stated to be flowing and probably originates largely in seepage. In reclaiming a large tract of irrigable land it will be necessary to use this water part of the season; but fortunately only during that part when minimum irrigation is required. At other periods the Colorado flows through this channel, and abundance of calcium sulphate water of otherwise suitable character will be available with which not only the black alkali of the previous irrigations can be neutralized but the accumulated white alkali washed out.

[Enclosure No. 6 with letter of Prof. R. H. Forbes, July 29, 1913.]

TABLE VIII.—Composition of waters on the Gila River.

Samples taken at the head of the Florence Canal, below The Buttes, Arizona.	Low winter water. Average of 7 weekly composites of samples taken daily, Nov. 23, 1899–Jan. 18, 1900.	Low winter water. Average of 5 weekly composites of samples taken daily, Feb. 1, 1900–Mar. 7, 1900.	Summer flood water. Average of 2 weekly composites of daily samples, Aug. 1–14, 1900.	Summer low water. Average of 2 weekly composites of daily samples, Aug. 15–23, 1900.	Summer flood water. Average of 4 weekly composites of daily samples, Sept. 1–28, 1900.	Summer low water. Average of 5 weekly composites of daily samples, Nov. 5, 1900.
1	Partial analysis					
Silt, per cent by weight.....	0.056	0.012	5.957	0.117	5.481	0.162
Soluble solid, parts in 100,000.....	116.8	113.6	54.2	62.5	47.1	108.5
Containing:						
Chlorine, stated as common salt, NaCl.....	66.2	63.3	15.9	39.5	9.4	59.7
Alkalinity, stated as sodium carbonate, Na ₂ CO ₃			3.66		6.65	
Hardness, stated as calcium sulphate, CaSO ₄	7.4	10.04		9.11		10.01
			Aug. 1–7.			
Nitrogen, parts in 1,000,000:						
Total nitrogen in silt and water.....	2.37	1.54	63.0.	1.97	40.60	1.37
Nitrogen in nitrates.....	.45	.56	.88	.79	.61	.51
Nitrogen in nitrites.....	Traces	Traces.	None.	None.	None.	None.
2	Complete analysis of soluble solids, stated by ions. Parts in 100,000 of water					
Sodium, Na.....	31.21	28.07			8.23	27.13
Potassium, K.....	1.78	1.38			2.26	1.51
Calcium, Ca.....	8.24	6.63	6.86	8.36	5.71	9.37
Magnesium, Mg.....	2.64	2.89	1.75	1.57	1.21	2.45
Chlorine, Cl.....	40.11	38.34	9.65		5.74	36.48
Sulphuric, SO ₄	15.59	16.50	9.47	13.07	9.64	14.56
Carbonic, CO ₃	6.53	6.93			11.08	12.78
Silicic, SiO ₂	7.52	6.52			2.66	5.11
3	Complete analysis of soluble solids, calculated to compounds. Parts in 100,000 of water.					
Sodium carbonate, Na ₂ CO ₃	12.08	10.47	12.66		16.65	
Sodium silicate, Na ₂ SiO ₃	68.19	61.31			4.27	8.20
Sodium chloride, NaCl.....	1.70				9.48	60.20
Sodium sulphate, Na ₂ SO ₄						1.14
Potassium chloride, KCl.....		2.43				
Potassium sulphate, K ₂ SO ₄	3.97	.24			5.04	3.37
Magnesium sulphate, MgSO ₄	.19	.58				
Magnesium carbonate, MgCO ₃	9.14	9.70			4.24	8.68
Calcium sulphate, CaSO ₄	17.30	22.54			9.71	16.92
Calcium carbonate, CaCO ₃					7.15	10.97

[Inclosure No. 7, with letter of Prof. R. H. Forbes, July 29, 1913.]

TABLE IV.—Composition of the waters of Salt River.

Samples taken at the Consolidated Canal Co.'s office, Mesa, Ariz., representing the Arizona Canal Dam supply.	High and low summer waters. Average of 4 weekly composites of samples taken daily, Aug. 1-Sept. 1, 1899.	Summer flood water. One weekly composite of daily samples taken Sept. 2-Sept. 9, 1899.	High and low summer waters. Average of 4 weekly composites of daily samples taken Sept. 10-Oct. 9, 1899.	Winter flood water. One composite of daily samples taken Oct. 10-Oct. 17, 1899.	Low winter water. Average of 10 weekly composites of daily samples taken Oct. 18-Dec. 30, 1899.	Low winter water. Average of 13 weekly composites of daily samples taken Feb. 17-May 30, 1900.	Very low summer water. Average of 8 weekly composites of daily samples taken June 1-Aug. 4, 1900.
1	Partial analyses.						
Silt, per cent by weight.....	0.32	0.95	0.096	0.714	0.025	0.024	0.026
Soluble solids, parts in 100,000.....	72.40	110.00	114.20	95.20	102.64	106.90	139.15
Containing:							
Chlorine stated as common salt, NaCl.....	46.2	52.1	72.9	61.9	67.6	72.2	98.1
Alkalinity stated as sodium carbonate, Na ₂ CO ₃		1.80					
Permanent hardness stated as calcium sulphate, CaSO ₄	*1.59		2.79	2.45	2.12	5.43	13.70
Nitrogen, parts in 1,000,000:							
Total nitrogen in silt and water.....	6.94	26.7	4.36	12.19	1.96	1.48	1.30
Nitrogen in nitrates.....	1.32	1.2	1.90	1.52	1.21	.67	.78
Nitrogen in nitrites.....					Traces nearly always.		
2	Complete analyses of soluble salts, stated by ions. Parts in 100,000 of water.						
Sodium, Na.....	12.2	18.3	27.45	.....	30.99	32.7	40.73
Potassium, K.....	1.29	1.41	1.09	.....	1.53	1.23	1.12
Calcium, Ca.....	6.79	10.2	7.24	.....	4.02	4.37	6.51
Magnesium, Mg.....	1.74	2.33	2.79	.....	2.84	2.92	3.28
Chlorine, Cl.....	27.99	31.67	44.11	.....	40.96	43.75	59.44
Sulphuric, SO ₄	9.79	4.81	7.27	.....	7.48	7.64	9.19
Carbonic, CO ₃		15.45	8.02	.....	11.71	11.51	13.15
Silicic, SiO ₂	2.06	1.11	5.83	.....	4.65	5.29	3.55
3	Complete analyses of soluble salts calculated to compounds. Parts in 100,000 of water.						
Sodium silicate, Na ₂ SiO ₃	3.31	1.79	9.35	.....	7.46	8.50	5.69
Sodium chloride, NaCl.....	27.84	42.80	60.84	.....	67.54	72.16	98.04
Sodium sulphate, Na ₂ SO ₄.....				.....	4.97	3.46	.07
Sodium carbonate, Na ₂ CO ₃		1.80		.....			
Potassium chloride, KCl.....	2.45	2.69	2.07	.....			
Potassium sulphate, K ₂ SO ₄.....				.....	3.40	2.74	2.50
Magnesium chloride, MgCl ₂	6.88*	5.81	8.34	.....			
Magnesium carbonate, MgCO ₃		3.03	2.37	.....	9.93	10.21	11.49
Calcium chloride, CaCl ₂	7.50			.....			
Calcium sulphate, CaSO ₄	13.87	6.82	10.20		3.18	5.37	11.00
Calcium carbonate, CaCO ₃		20.48	10.53		7.71	7.00	8.20

River
Tussey Cr.

STATUE
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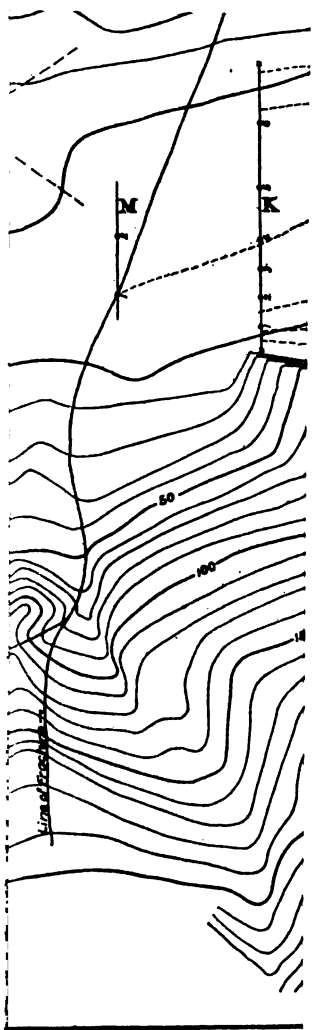
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by U.S. Reclamation

Area
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- 0
- 17
- 41
- 84
- 210
- 488
- 934
- 1,549
- 2,195
- 2,624
- 3,475
- 4,148
- 5,191
- 6,230
- 7,348
- 8,600
- 9,960
- 11,390
- 12,820
- 14,250
- 15,680
- 17,110
- 18,540
- 19,970



PANAMA CANAL TOLLS

ADDRESS

OF THE

PRESIDENT OF THE UNITED STATES

DELIVERED AT A JOINT SESSION OF THE
TWO HOUSES OF CONGRESS

MARCH 5, 1914



MARCH 5, 1914.—Referred to the Committee on Interstate and Foreign
Commerce and ordered to be printed

WASHINGTON
1914



ADDRESS.

GENTLEMEN OF THE CONGRESS:

I have come to you upon an errand which can be very briefly performed, but I beg that you will not measure its importance by the number of sentences in which I state it. No communication I have addressed to the Congress carried with it graver or more far-reaching implications as to the interest of the country, and I come now to speak upon a matter with regard to which I am charged in a peculiar degree, by the Constitution itself, with personal responsibility.

I have come to ask you for the repeal of that provision of the Panama Canal Act of August 24, 1912, which exempts vessels engaged in the coastwise trade of the United States from payment of tolls, and to urge upon you the justice, the wisdom, and the large policy of such a repeal with the utmost earnestness of which I am capable.

In my own judgment, very fully considered and maturely formed, that exemption constitutes a mistaken economic policy from every point of view, and is, moreover, in plain contravention of the treaty with Great Britain concerning the canal concluded on November 18, 1901. But I have not come to urge upon you my personal views. I have come to state to you a fact and a situation. Whatever may be our own differences of opinion concerning this much debated measure, its meaning is not debated outside the United States. Everywhere else the language of the treaty is given but one interpretation, and that interpretation precludes the exemption I am asking you to repeal. We consented to the treaty; its language we accepted, if we did not originate it; and we are too big, too powerful, too self-respecting a nation to interpret with a too strained or refined reading the words of our own promises just because we have power enough to give us leave to read them as we please. The large thing to do is the only thing we can afford to do, a voluntary withdrawal from a position everywhere questioned and misunderstood. We ought to reverse our action without raising the question whether we were right or wrong, and so once more deserve our reputation for generosity and for the redemption of every obligation without quibble or hesitation.

I ask this of you in support of the foreign policy of the administration. I shall not know how to deal with other matters of even greater delicacy and nearer consequence if you do not grant it to me in ungrudging measure.



ABRAHAM LINCOLN.

SPEECH OF HON. S. D. FESS, OF OHIO, IN THE HOUSE OF REPRESENTATIVES, THURSDAY, FEBRUARY 12, 1914.

MARCH 12, 1914.—Ordered to be printed.

The House met at 12 o'clock noon.

The Chaplain, Rev. Henry N. Couden, D. D., offered the following prayer:

God our Father, make us worthy of the memory of Abraham Lincoln, a great soul whom Thou didst send into the world with a destiny to fulfill, not only for his people but for all the world; a superb intellect; a heart of love; a devotion which enabled him to see far beyond the vision of his contemporaries; a courage which swept him on without fear where others faltered; a faith which in the darkest hours failed him not. Surely he belongs to the ages, will live in the ages, and while he lives this Republic will live to bless mankind. "O Lord, God of hosts, be with us yet, lest we forget" his sublime example and the stupendous work he accomplished, "That government of the people, by the people, for the people shall not perish from the earth." For Thine is the kingdom and the power and the glory forever. Amen.

The Journal of the proceedings of yesterday was read and approved.

The SPEAKER. By special order, the gentleman from Ohio [Mr. Fess] is permitted to address the House for 30 minutes on the life and character of Abraham Lincoln. [Applause.]

Mr. FESS. Mr. Speaker and Members of the House, I esteem it no small privilege or little honor to be permitted to speak to this group of legislators upon what I regard as one of the most remarkable characters in human history. Just 53 years ago yesterday, standing upon the platform of a train that was to bear him to Washington, Abraham Lincoln addressed a large concourse of people in his city of Springfield, in which address he said:

Will you not pray for me that the same Arm that supported the great Washington may be my support? For with that support I can accomplish my duty; without it I can not do anything.

The train stopped at the little town of Tolono, where, as in every town through which the train passed, a large concourse of people gathered. The train stopped for the engine to take water. Mr. Lincoln was not expected to speak, but finally he did respond to the great cry of the people who had gathered, and came out on the platform and said:

I am upon a journey fraught with a great deal of concern to you and to me. May the words of the poet still be true, "Behind the clouds the sun is still shining." Good-by. God bless you.

He then resumed his seat in the train.

Some men make their place in history by notable utterances, others by notable deeds. Few in the world's history have the credit of both, and to that class belongs Abraham Lincoln. At an early time in his political career, speaking upon the most sensitive question before the country then or since, he showed his courage by saying:

Broken by it I, too, may be; bow to it, I never will. The probability that we may fail in a worthy cause is not a sufficient justification for our refusing to support it.

In 1855, in a letter to Judge Robertson, of Kentucky, he said:

The one question that wears upon me is, Can our country permanently endure half slave and half free? It is too much for me. May God in his mercy superintend the solution.

Three years later, in 1858, in a convention in Springfield, Ill., where he was nominated for the position of Senator—for the seat then occupied by Douglas—he announced the same principle, "I do not believe that this Government can permanently endure half slave and half free." This announcement sounded like a fire bell would sound at the hour of midnight in a country village. It was taken up by the entire country. It was quoted in the London Times and other publications of Europe. It was pronounced by many of our statesmen as revolutionary. Stephen A. Douglas, one of the brainiest men of the country, and one of the most courageous as well as patriotic, believed that it was a dangerous doctrine, and announced that he would reply to it in his home city of Chicago on the 9th of July.

Mr. Lincoln went to Chicago to be present on that occasion. He heard one of the most powerful arguments against his position that probably could be made. At the close of that meeting he arose and, in substance, said:

I shall be here to-morrow night at which time I will pay my respects to my friend, the judge, who has charged me with an attempt to array one section of the country against the other. I hope some of you will come out to hear my side of the story.

The next night Mr. Lincoln greeted a great audience, upon which he made a profound impression. When Mr. Douglas went to Bloomington, Ill., to speak, Mr. Lincoln followed him. Mr. Douglas noticed while he was speaking that Mr. Lincoln was in his audience again. He referred to the fact with some feeling. On the afternoon of the 17th of July Mr. Douglas spoke in Springfield, and on that night Mr. Lincoln also spoke. Then Mr. Lincoln wrote a challenge to Mr. Douglas; asked him to go on the same platform with him, divide the time, and discuss the question. The result of this was that a series of debates, seven in number, the most notable in American political history, was arranged. In the debate, when Mr. Douglas propounded a series of questions to Mr. Lincoln, Mr. Lincoln replied to them categorically, and then propounded a series, and dwelt upon one as the key to the entire situation. That question was:

Can the people of a Territory in any lawful manner against the wishes of the citizens of any of the States exclude slavery from within its limit prior to the adoption of a State constitution?

He pressed it. Mr. Douglas was the author of the popular sovereignty scheme, as you all know, the authority of control of such questions must be left to the people of the States. The friends of Mr. Lincoln went to him and said, "Do not press that question; if you

insist on an answer you can never be elected to the senatorship in this country." Mr. Lincoln replied, "If Mr. Douglas answers my question, yes or no, he can never be elected President of this Nation, and I am looking for larger game." That did not mean that Mr. Lincoln was at that time looking for himself to the Presidency, because that debate was in 1858, and as late as 1859 Mr. Lincoln replied to a letter written to him by a friend about being Vice President, "I am not fit to be Vice President of the United States." Mr. Lincoln in 1858 was simply stating that if Mr. Douglas answered that question he, Mr. Douglas, could never be elected to the highest position in the gift of the people of the country. In 1859 Mr. Lincoln made that notable speech in Columbus, Ohio, one of the greatest contributions to the political literature of his day. Then in February of 1860, speaking in the heart of New York City at Cooper Union, he gave, I think, the finest type of the periodic sentence in a long speech to be found anywhere. From the standpoint of the rhetorician as a critic this long speech is a gem in American political literature. This is the meeting over which the eminent poet Bryant presided and introduced Lincoln as a "distinguished citizen of the United States." I believe, gentlemen, that the Cooper Union speech is the finest exposition of the sensitive issue, and that it was put in the most rhetorical form of any long speech in our literature, and he did it with such magnanimity. He said:

If slavery is right, then all that the South asks we can readily grant. If slavery is wrong, then all that the North asks the South can readily grant. Their thinking it right and our thinking it wrong is the precise point upon which turns this whole controversy; but thinking it wrong, as we do, we can afford to leave it where it now exists by virtue of the law, but can we afford to allow it to go into new territory?

There, for the first time the real issue was presented by Mr. Lincoln; not the issue of the abolitionist, but the issue of Mr. Lincoln of the constitutional power of the Congress to control property in a Territory, which was to give rise to an organization of public opinion that was not to abate until slavery was no more. That was in 1860. In 1861, in his famous inaugural address, he said:

Friends can make laws easier than enemies can make treaties. We must not be enemies; we must be friends. Though passion may have strained, it must not break the bonds of our affection. The mystic chords of memory stretching from every battle field and patriot's grave to every heart and hearthstone all over this broad land will swell the chorus of the Union when again touched, as it surely will be, by the better angels of our nature.

With his keen perception of the mighty issue he was also wonderfully magnanimous.

This magnanimity that was uttered at that time had been uttered in the town of Steubenville, Ohio, a little while before, when on his way to Washington, looking across to the State of Virginia, his father's native State, he said to that concourse of people on the Ohio side:

Only the river divides us, and you on the other side are just as sincere in your contention as we on this side.

On this trip he addressed the Legislatures of Indiana, Ohio, New York, and Pennsylvania, all notable speeches, teeming with evidence of his grasp of the situation facing him. When he reached Philadelphia, out in front of old Independence Hall, he said, on the occasion of raising the American Flag over the hall:

What principle has kept our States so long together? It is not the mere fact of separation from the mother country, but it is the principle found in the Declaration of Independence, penned by the immortal Jefferson and adopted in this hall, that gave

promise not alone to the people of our own country but to all the people of all the world that ere long the weight shall be lifted from the shoulders of all men and all shall have an equal chance. Now, my fellow citizens, can the Nation be saved upon that basis? If it can and I can help to save it, I am the happiest man in it, but if it can not I was about to say I would rather be assassinated on this spot than to surrender it.

That was on the 22d day of February, 1861, in the famous Independence City, out in front of Independence Hall. I mention these historical utterances, so notable and significant in their meaning, because I would like to have this body recall this wonderful ability in expression, the like of which probably is not known in any political orator or figure in our country. Why, it was none other than Prof. Bailey, a professor of rhetoric in a famous American college, who had been so charmed with the pure English of this plain statesman of the West that he sought an interview to ascertain the secret of his power. Mr. Lincoln at first expressed surprise that he had any power in utterance, but when pressed he substantially said: "Well, all I can remember is that when neighbors would come to my father's house and talk to father in language I did not understand, I would become offended, sometimes, and I would find myself going to bed that night unable to sleep. I bounded it on the north, south, east, and west until I had caught the idea, and then I said it myself, and when I said it I used the language I would use when talking to the boys on the street." Prof. Bailey said: "That is one of the most splendid educational principles I have ever received from any man." To which Mr. Lincoln expressed great surprise.

Mr. Lincoln's ability to express the English language consisted in the use of the small word. Eighty-five per cent of his words are monosyllabic. He never employed a big word when a little one would do. He never clouded his thought by a multiplicity of words. His sentences were always short and their meaning never involved. In a word, he never spoke to be heard, but always to be understood; and therefore he was not always elegant from the standpoint of the rhetorician, but wonderfully expressive. For example, he would say, "I dumped it into a hole"; but Douglas, the rhetorician, would say, "I deposited it into a cavity," which is a good deal better from the standard rule of expression. Lincoln would say, "I dug a ditch"; Douglas would say, "I excavated a channel." Lincoln said, "My defeat by Douglas in 1858 was due to bad luck; I ran at the wrong time"; Douglas said, "It was due to a strange fortuitous combination of importune contingencies that nobody could have foreseen." Here stands Stephen A. Douglas, a master of rhetoric; Abraham Lincoln, a master of logic; Stephen A. Douglas, eloquent in words; Abraham Lincoln, eloquent in thought; Stephen A. Douglas appealing to expediency; Abraham Lincoln, appealing to right. Douglas said, "I do not care whether you vote slavery up or vote it down." Lincoln said, "I care very much about what most people care most about." He turned his back upon his audience and spoke to Douglas, "Is it not a false philosophy to build a system upon the basis that you do not care anything about what most people care most about?" It was for that sentence that Mr. Douglas paid him such a tribute in three weeks after the close of those debates. Mr. Lincoln was powerful in this series of debates, and it was here that his wonderful ability as a thinker and debater was first disclosed to the public. I say to

you men of Congress that Abraham Lincoln had not an equal on the American platform in the use of pure Anglo-Saxon.

If you think that I am overstating, I have two items of evidence that any lawyer will accept as fairly conclusive. In Oxford University, England, you will hear the finest English taught and spoken of any place in the world. An American visiting this great seat of learning will be led to a corridor where can be read one of the famous letters written by this man, known to the world as unlettered, or illiterate, because he was not a collegiate, the letter to Mrs. Bixby, the mother of five sons, all of whom gave their lives for their country.

DEAR MADAM: I have been shown in the files of the War Department a statement of the adjutant general of Massachusetts that you are the mother of five sons who have died gloriously on the field of battle. I feel how weak and fruitless must be any words of mine which should attempt to beguile you from the grief of a loss so overwhelming. But I can not refrain from tendering to you the consolation which may be found in the thanks of the Republic they died to save. I pray that our Heavenly Father may assuage the anguish of your bereavement and leave you only the cherished memory of the loved and lost, and the solemn pride that must be yours to have laid so costly a sacrifice on the altar of freedom.

Yours, very sincerely and respectfully,

ABRAHAM LINCOLN.

This letter, thus permanently preserved, is pronounced by the savants of Oxford as one of the finest letters of condolence ever written in our language. Note its beauty, its purity, its sublimity.

If that is not sufficient evidence, then go to the British Museum, where can be found books enough, if put on a single shelf, to reach 40 miles. Ask the authorities there what their judgment is as to the finest short speech in the English language. You will be handed at once this splendid piece of rhetoric and high mark of literary appreciation, as well as statesmanlike delivery, at Gettysburg, November 19, 1863:

Fourscore and seven years ago our fathers brought forth on this continent a new Nation, conceived in liberty and dedicated to the proposition that all men are created equal.

Now we are engaged in a great civil war, testing whether that Nation, or any nation so conceived and so dedicated, can long endure. We are met on a great battle field of that war. We have come to dedicate a portion of that field as a final resting place for those who here gave their lives that that Nation might live. It is altogether fitting and proper that we should do this.

But, in a larger sense, we can not dedicate, we can not consecrate, we can not hallow this ground. The brave men, living and dead, who struggled here have consecrated it far above our poor power to add or detract. The world will little note nor long remember what we say here, but it can never forget what they did here. It is for us, the living, rather to be dedicated here to the unfinished work which they who fought here have thus far so nobly advanced. It is rather for us to be here dedicated to the great task remaining before us—that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion; that we here highly resolve that these dead shall not have died in vain; that this Nation under God shall have a new birth of freedom; and that government of the people, by the people, for the people shall not perish from the earth.

When he finished, the orator of the day, Edward Everett, walked over to the President, took his hand, and in substance said: "Mr. President, if I could congratulate myself upon the belief that in two and a quarter hours I had been enabled to put the issue as clearly as you have done it in two and a quarter minutes, I would regard myself as a happy man."

This speech the British Museum authorities regard as one of the finest short speeches uttered in the English language. Who is this

man that he could thus speak and write? Born in a hut, of the most humble surroundings, at the age of 7 he accompanied his parents and sister into Indiana, where they lived one winter in an open camp with but three sides to it. And yet, without ever having, as a pupil, a lead pencil or a piece of paper, a slate pencil or a slate, without having gone to school but six months all told, according to his own statement, here is a man thus starting with no convenience who has reached a plane, an ability to speak the English language, not yet reached by scholars of the day. Where is the secret? I think that it might be found in the sort of books he read. What are they?

The one book with which he was quite familiar was King James's version of the Bible. I once heard Parks Cadman, pastor of the greatest Congregational Church in the world, say that Abraham Lincoln's verbal knowledge of the Bible was not equaled by the theologians. I would not state that upon my own authority, but I cite it upon his authority. He knew Shakespeare, and in the darkest hours of the Nation's life, in the midst of great depression, often when the Cabinet was in session, Mr. Lincoln would throw himself back in an armchair and quote page after page of Shakespeare, until the scholarly Seward would turn to him and say: "Why, Mr. President, our understanding has been from the beginning that you have never gone to school, and yet you quote Shakespeare as I do not, and I am regarded as somewhat of a Shakespearean scholar."

Bunyan's *Pilgrim's Progress* was another book that he read. Feed a growing mind upon the English of these texts and you will have a choice of English. I concede the speeches before mentioned to be a high rank of expression, but I think the high-water mark was reached on another occasion, when looking back over four years of awful war, a period of the bitterest hatred and almost vicious calumny, on the part of his foes at least, and during which period no man's heart was bleeding more than his, he said:

Both read the same Bible and pray to the same God, and each invokes His aid against the other. The prayers of both could not be answered. That of neither has been answered fully. The Almighty has His own purposes. If we shall suppose that American slavery is one of those offenses which in the providence of God must needs come, but which, having continued through His appointed time, He now wills to remove, and that He gives to both North and South this terrible war as the woe due to those by whom the offense came, shall we discern therein any departure from those divine attributes which the believers in a living God always ascribe to Him?

Fondly do we hope, fervently do we pray, that this mighty scourge of war may speedily pass away. Yet, if God wills that it continue until all the wealth piled up by the bondman's 250 years of unrequited toil shall be sunk and until every drop of blood drawn with the lash shall be paid by another drawn by the sword, as was said 3,000 years ago, so still it must be said: "The judgments of the Lord are true and righteous altogether." With malice toward none, with charity for all, with firmness in the right as God gives us to see the right, let us strive on to finish the work we are now in, to bind up the Nation's wounds, to care for him who shall have borne the battle and for his widow and his orphan, to do all which may achieve and cherish a just and lasting peace among ourselves and with all nations.

Here is one of the finest prose poems in the literature of our language, and, in my judgment, is the highest reach in refinement of utterance we have from this remarkable leader of men not only in thought but as well in deed.

And I think of how he suffered in the White House as the head of the Nation, so distracted by civil war and he helpless to end the strife. One night he said to Frank Carpenter at the dead hour of

midnight, standing with his hands in this shape [indicating]: "Oh, Carp, Carp, what would I give to-night in exchange for this wearisome hospital of pain and woe that they call the White House for the place that is occupied by some poor boy that sleeps under the sod in a southern battle field? I can not stand this thing much longer. I have got to have some relief." When I read from Carpenter, the painter of the famous emancipation picture, I instinctively say: "Oh, Jerusalem, Jerusalem, how oft would I have gathered thee as a hen gathereth her chicks under her wings, but ye would not."

Oh, my dissatisfied countrymen, you who can not understand the suffering and the heartbeats, the great distress of the head of the Nation, how changed would be your attitude if you could but see him in his agony for the Nation. If we could have understood his sufferings, we would not have had the feelings of bitterness that were so often expressed. My friends, this hatred was not confined to any one section of the country, as you well know. I was rocked in a cradle over which was sung the lullaby:

Old Abe Lincoln is dead and gone.
Hurrah! Hurrah!

And I am not the only one in the State of Ohio who was taught that he was not a patriot. But when I come to look into his words and to study his acts and with regard for his magnanimity, together with his intellectuality, I can easily understand why, in the lapse of half a century, there is such universal approval now of the characteristics of that great man in all parts not only of our Nation but of the world.

I once asked one of the best editors in this country or in any other, Charles A. Dana, who knew Mr. Lincoln as perhaps no other man knew him during the period that covered the war, what he thought was Lincoln's secret of greatness. Quickly he said: "His control of men." And then he added: "If a man can not control other men, then his power is limited to what he can do alone. On the other hand, if he can control men his power is multiplied just to the number of men he controls."

In view of this theory I am not so sure but that we might possibly for a moment pause to fix our eyes upon the White House now, with reference to that quality of leadership. But this is not the place nor the hour for making comparisons. They might be misunderstood. Mr. Lincoln had that ability to differ from men and yet to win them. Note how he struggled with the great commoner, Thaddeus Stevens. When Lincoln insisted upon his method of Reconstruction, which Stevens denounced as his shorthand method, destined to swamp the American Congress by Confederate leaders, Lincoln put it in this homely way, or substantially in these terms: "Stevens, you want what I want, but we do not go after it in the same way. Concede that my policy, which you criticize, is now in its beginning to what the policy is when it is finished, as an egg is to the chicken when it is hatched, do you not think you will get that egg quicker by hatching it than by smashing it?" A homely illustration that carries in it a sound philosophy.

That is an example of the way he had of reaching Mr. Stevens. He had his own way of dealing with the leaders of the day, such men as Mr. Seward, and especially Mr. Stanton, both of whom he regarded

as the greatest Secretaries of their respective departments. In the early part of the administration the country looked upon Mr. Lincoln as a much inferior man to Mr. Seward. None knew this better than the great Secretary. This explains the strange suggestion of Seward.

He reminded Lincoln that after so long the Government was still without a policy, and said that while he did not seek it, if the President desired, he would assume the responsibility. The reply by Lincoln is historic, and discloses his rare talent to control men. The policy was forthcoming, but it was not that of any Cabinet officer. A similar instance is when he rejected Seward's proposed adjustment of the *Trent* affair and directed it himself by taking Seward's proposed plan and blue-penciling two-thirds of it as useless and dangerous. In spite of this wide difference between them, the time came when Mr. Seward said, "I know the men of my time, and I believe Mr. Lincoln was truly the best man I ever met in public life."

On the night of the second election quite a scene took place between Lincoln and Stanton. Dana said, "Whitelaw Reid came in, and I, as a matter of courtesy, withdrew and went into another room, where Stanton was. It was not long before I noticed that Stanton was quite indignant. He was walking the floor greatly disturbed. I said to him, 'What troubles you, Mr. Secretary?' and he pointed his hand through the door toward Lincoln." Dana said that Lincoln at that moment was a very comical figure. He was sitting leaning back against the wall, his legs crossed, and laughing convulsively. He had just read to Reid something from the writings of Petroleum V. Nasby, the editor and humorist of the Toledo Blade, at that time almost as popular a writer as was Mark Twain later. "Stanton noticing that he was reading Petroleum V. Nasby seemed so angry," says Mr. Dana, "that he turned to me and said, 'Look there. There sits the man around whom the heartstrings of this Nation are wrapped to-night, being amused over a damned mountebank.'" Evidently Mr. Lincoln must have heard him, for he immediately called to Mr. Stanton, "Mr. Secretary, have you ever read anything written by Petroleum V. Nasby?" And Whitelaw Reid, who was sitting by, said, "Nasby; Mr. President, Nasby," when Mr. Lincoln repeated "Nasby." Mr. Stanton replied, "No; I haven't time for such buncombe." Mr. Lincoln said, "Here is some buncombe that you would enjoy." He added, "Nasby says there are three kinds of fools. There is the natural fool and the educated fool, and when you take a natural fool and try to educate him, you have a damphool." [Laughter.] Dana said Stanton did not enjoy the joke at all. [Renewed laughter.]

Mr. Stanton seemed so different from Mr. Lincoln, and people are speculating now as to whether they were friendly to one another. The difference was one of temperament. They were equally sincere and patriotic. The brusque demeanor of the Secretary was ever in sharp contrast with the childlike kindness and affectionate regard of the great President. The two men quite frequently clashed for the moment over policies. These differences usually grew out of Lincoln's pardoning habit. You will recall that Lincoln ordered some persons that had been imprisoned at Baltimore upon the charge of treason for the sale of goods to the Confederacy to be liberated, against the wishes of Stanton, and Judge Holt—

[Here the hammer fell.]

The SPEAKER. The time of the gentleman from Ohio has expired. Mr. YOUNG of North Dakota. The gentleman from Ohio [Mr. Fess] should have an extension of an hour.

Mr. WILLIS. Mr. Speaker, I ask unanimous consent that my colleague be allowed to proceed to the conclusion of his remarks.

The SPEAKER. The gentleman from Ohio [Mr. Willis] asks unanimous consent that his colleague [Mr. Fess] be permitted to proceed without limit. Is there objection? [After a pause.] The Chair hears none.

Mr. FESS. Mr. Speaker, I thank you and the Members of the House for this courtesy, and I shall certainly respect it enough not to keep you very long. [Cries of "Go on!"] That gavel knocked out of my mind what I was saying. [Laughter.]

A MEMBER. You were talking about certain kinds of fools. [Laughter.]

Mr. FESS. It was the incident over in Baltimore. It was said that Judge Holt, of Kentucky, went over in confidence on the order of the President and made some arrangement to let the people out without regard to Mr. Stanton's wishes. Mr. Stanton was very much enraged, and he called Mr. Holt, a subordinate, "on the carpet"; but Judge Holt defended himself on the ground that the President had ordered him to do it. It is reported that Mr. Stanton said, "Did Lincoln order you to do that?" Holt said he did. Stanton hesitated a moment and then said, "Holt, the only thing left us is to get rid of that baboon in the White House."

That is a very serious statement to make on the floor of this House when regarded from the standpoint of the relation between chief and subordinate, but it is in the reminiscences. When the matter came to the notice of Mr. Lincoln he said, in good humor, "Did Stanton say that?" He was assured that he had; and another person speaking with him said, "I would not endure the insult." Lincoln said, "Insult? That is no insult. All he said was that I was a baboon, and that is only a matter of opinion, sir," and then added, "and the thing that concerns me most is that Stanton said it, and I find he is usually right." [Laughter and applause.]

Oh, such magnanimity, when a difference clothes itself in language of insult as well as ridicule, in such a great soul; to differ from men and still hold their respect to the last was a quality possessed in abundance by the great Lincoln.

On one occasion when Stanton chided the President for allowing a mother-in-law to impose upon him on behalf of her daughter whose husband was to be shot for desertion, in which the Secretary expressed a doubt whether the old lady really cared about the fate of the man, Mr. Lincoln replied, "It may be she did not. I did not see the lady while she was speaking. I only saw the poor young woman who was so soon to become a widow unless I interposed."

Here is but one of scores of incidents to show his magnanimous spirit to his inferior, and at the same time that beautiful temper of mercy of which many were beneficiaries.

In evidence of this power over men note this incident: A retired Presbyterian minister said to me recently, "My inspiration and success as a preacher came from Lincoln, when after I had made my report to Congress of the work of the Sanitary and Christian Commission, Mr. Lincoln said to me, 'The good God has blessed you,

young man, with power to influence men. Go on in the way you have started. Pay more attention to the hearts of men rather than to their heads.' " That became my guiding principle.

What is the secret of Mr. Lincoln's ability to control men like Seward and Stanton and Stevens, and other men who were so wonderfully different in temperament and eminently superior to him in all that went to make up modern standards? I think I can give a solution to the mystery. It is in a combination of two qualities that are usually found in leadership. The one is that wonderful fund of humor and the other is that deep sense of pathos. At one moment Mr. Lincoln would make you laugh. At another moment you would want to cry. Strange as it may seem, these seeming contradictories are generally present in the same person. If Lincoln was the most comical man in public life, he was certainly the saddest. The world tires of the person who plays on but one string.

I distinctly recall an incident that is told by Carpenter. Mr. Lincoln frequently went out here to the hospital near Washington, not simply to be in the presence of sorrow but to comfort the wounded soldiers, many of whom were dying by the inch. On one occasion he had spent a good deal of time out there—most of the day. Just as he was ready to get into the carriage to return, somebody rushed out and said to one of the men with him, "I wish you would tell the President that in a part of the hospital that he did not visit there is a Confederate soldier, and he is dying; he wants to see the President." The matter was referred to the President, and he said, "I shall go back." He excused himself for a moment, and was led back to where the Confederate soldier was lying upon the cot, and when he came to the sufferer all that he could hear the soldier say was, "I knew they were mistaken; I knew they were mistaken."

Evidently he had been told that Mr. Lincoln was the sort of a man that I had been taught he was, and he had found that he was not. When Mr. Lincoln took his hand and asked him what he could do, he said, "The surgeon says I can not get well; I do not know anybody here, and I wanted to see you before I died." When Mr. Lincoln asked him what he could do, there was something said by the poor boy in regard to what he wanted sent home, and then Mr. Lincoln stooped and took his hand in his two. The President, standing in that fashion, said, "Now, my boy, is there anything else I can do? I have been here most of the day; I am busy, and I must go." The boy said in broken tones, "Oh, I thought, if you did not mind, you might stay and see me through." And there stood the President bending over the dying soldier and copious tears dropping upon his coat sleeves.

Men of this House, that is the most beautiful picture in American history. If I were a painter and wanted to paint Lincoln, I would have to seize upon some particular moment of time, because you can not paint duration in a picture, and I would seize the moment when the President of this Nation, the mightiest Republic on earth, stooped and wept over a dying Confederate soldier, dying away from home. That is a most beautiful representation of the real Lincoln. [Applause.]

He has been misunderstood in regard to the slavery agitation. Mr. Lincoln's greatest work, gentlemen, was in the preservation of the Union. Do you not remember in 1863 what a bitter letter he

received from Horace Greeley, published in the New York Tribune as an open letter to the President, in which Greeley called him "an opportunist"? Mr. Lincoln replied to it—and I want to give you exactly his reply; and, therefore, you will allow me to read that reply. It is one of the suggestive utterances of his life. He replied:

As to the policy I seem to be pursuing, I have not meant to leave anyone in doubt. I would save the Union. I would save it in the shortest way under the Constitution. The sooner the national authority can be restored the nearer the Union will be the Union as it was. If there be those who would not save the Union unless they could at the same time save slavery, I do not agree with them. If there be those who would not save the Union unless at the same time they could destroy slavery, I do not agree with them. My paramount object is to save the Union and not either to save or to destroy slavery. If I could save the Union without freeing any slave, I would do it. If I could save it by freeing all the slaves, I would do it.

Then he added:

I am ready to accept new views as soon as they are proved to be true views.

I do not mean here to minimize the title of the "great emancipator." I simply mean that the one supreme purpose of his career was to preserve the Union. This does not and should not detract from his achievement as the leader who, by the stroke of his pen, lifted a race out of human chattelhood into the atmosphere of American citizenship. But that achievement was destined to take place; if not by his hand, then by another's. The institution of slavery was indicted by the civilization of the centuries and had to succumb. However, this could not be said of the preservation of the Union. The greatest single achievement in the history of civil government in the world is the preservation of republican form of government. Since the close of the Civil War this idea has spread over the world like the waters cover the sea. There is not a single country that is not feeling the mighty impulses for self-government, the finest example of which is our own Republic. In fixing Lincoln's place in history it will not be so much the emancipator of a race as the savior of a nation and republican government on the earth. Both of these accomplishments demanded the best talent of head and heart.

He had other elements of statesmanship. His heart throbs for liberty never carried him to the shoals of license. On the other hand, reverence for law was fundamental with him. On one occasion he said:

Let reverence for the law be breathed by every American mother to the babe that prattles on her lap; let it be taught in schools and colleges; let it be preached from the pulpit, proclaimed in legislative halls, and enforced in courts of justice. And, in short, let it become the political religion of the Nation, and let the old and the young, the rich and the poor, the grave and the gay, of all sexes and tongues and colors and conditions, sacrifice unceasingly upon its altars.

When he was criticized for the appointment of Stanton, who had not supported him, a friend said to him, "Why, Stanton has not been in your favor." Mr. Lincoln said, "That is no matter. I met him down in Cincinnati in a lawsuit where I tested his mettle, and I know his power." And then the interested party said, "But you are the first President of a new party, and you would have a splendid opportunity to build up a political organization." Members of Congress listen to Lincoln in reply: "We will save the Union first and build a party out of what is left." That is another element of statesmanship, it seems to me.

On the other hand, notice the humor. May I give you an incident that Dana gave me? Lincoln was pestered with office seekers, strange to say, in that day as we are not so much (?) in this. These office seekers came from every place. One day Mr. Lincoln saw three men coming up the walk toward the White House. At the time he seemed in exceptional spirits with humor bubbling over. Lincoln was looking out of the window. He said, "Dana, look. Those three men have been here before. This is the third or fourth time they have come. They want an office. I do not know even where it is. I do not know whether it is in Missouri or Illinois. It would not make any difference whether Tom, Dick, or Harry had it. It will not pay over \$180 a year." Dana urged him not to receive them, when Lincoln replied, "Oh, yes; I will receive them."

About that time the man whose duty it was to announce callers to the President came in and told him there were three men from the West who wanted to see him, and asked what he should say to them. Lincoln said, "Bring them in and let them sit down here." I wish I could tell this story as Dana told it, but I can not. Dana said the three men came in and took their seats, and Mr. Lincoln, after greeting them, said to them, "Excuse me, gentlemen, until I finish a story I was telling Dana." He had not been telling any story at all, but he began: "I think I was about 13 years old. Our fashion was to meet in Sunday school, where we would read sometimes in the Old Testament and sometimes in the New. On this particular day we were reading in the Old about the three Hebrew children. In that class we always would stand in line; the first boy would read and then the next, and if anybody made a mistake the fellow next to him would correct him, turn him down, and go up. There was one fellow in the class, about as tall as I was, who never had learned to read, and he always stood at the foot. (Just excuse me, gentlemen, in a few minutes I will be through with this.) When it came this fellow's turn to read, he read something like this, holding his finger on the page to keep the place, and reading in a loud monotonous tone, hesitating on every word: 'And — a — part — of — the — kingdom — was — to — be — ruled — over — by — by — by —' 'Well,' said the teacher, 'read on, read on.' 'By — Meshach, — Shadrach, — and — Abed-nego.' (Just excuse me, gentlemen, in a few minutes I will be through.) Then the next boy read, and then the next one, and it came around to this boy at the foot again, and the teacher said to him, 'Read that fourteenth verse.' It was the same verse. So he read the same verse again, and in the same hesitating way: 'And — a — part — of — the — kingdom — was — to — be — ruled — over — by — by — by — well, if there don't come them same three goll durned fools again.' " [Laughter.]

The leader said, "Mr. President, we will come some time when you are not so busy." As soon as they were out Lincoln said to Dana, "Didn't we fetch 'em this time?"

If you link the quality of humor, which is always present, to the other quality of pathos, which was instinctive with him, you have the elements in combination that made him the leader of men. It would be easy to illustrate the two qualities by the great number of incidents similar to these I have mentioned in his life.

Then there are two other abiding qualities in the man that I find in my study of him that I think this House ought now to think about.

They are the fundamental qualities that make his name an increasingly important one in our history. The first one is faith in the people. I do not believe America shows in her history any man who had equal faith in the common goodness of mankind. It welled up in both word and deed upon every hand, in season and out of season. I have the greatest admiration for Samuel Adams, of Massachusetts—the man of the town meeting and one of the country's most distinguished Democrats, past or present. I have also the greatest admiration for Thomas Jefferson, of Virginia, the author of the Declaration of Independence and the founder of the Democratic Party.

As a man who has lived all his life in the study of history, I have a wonderful admiration for the hold those men had upon the people, in their faith in the people. But, Members of this House, with due regard for the faith of the fathers, I think Abraham Lincoln was in the truest sense a man of the people, one among the people, and in sympathy with the people beyond any man in our history. I do not think any man can come to his shoulders in this attribute if measured by what he said, by what he did, by what he really was in that respect. When a man said to him, "The people will go wrong on this matter," he replied, "Intellectually, probably they may; morally, never." The collective wisdom expressed in morals is always better than individual wisdom. "In the multitude of counsel there is safety," said he, quoting it from the Good Book. I could give you numerous suggestions falling from his lips, expressions like these: "God must have loved the common people, for He made so many of them." "You can fool all of the people some of the time, some of the people all of the time, but you can not fool all of the people all of the time." You know people have said it was Barnum who said that. It was not. It was Lincoln. It is Lincolnian. He believed in the people. In other words, he did not think the Government was going to the bowwows if attempts were made at some innovation, or changes were inaugurated in the interest of the public. He never failed to see the distinction between an attempt to suppress public opinion and to direct public opinion. The first is unwise; the second is rational. He fearlessly indicted the cowardice of such procedure. After the fugitive-slave law was made a part of the Compromise of 1850, both of the leading platforms, Whig and Democratic, declared that the Compromise was the settlement of the slavery issue and forbade its further discussion. Lincoln knew such cowardice was like resolving the tide should cease to flow. Our business is to direct public opinion in the right channels, and not to attempt to suppress it. That was Lincolnian.

Another quality of his nature was his deep religious convictions. I do not believe we ever had any man in the presidential chair who was so profoundly religious in nature as Abraham Lincoln. Prof. Brooks, who was at the head of the educational movement in Illinois, came to him with the query, "Mr. Lincoln, we have been discussing your religious convictions." Mr. Lincoln said, "Well, what about it?" "We wondered how much time, if any, you devote to your relationship with your God." Mr. Lincoln turned to him and said, "Professor, I spend more time upon the thought of my relationship with my God than upon all other questions combined." That was Lincoln at a time when he had no reason to assert anything untrue about his belief. You will remember that when the brilliant, peerless

leader, Stonewall Jackson, was almost within reach of this Capital City, and the Cabinet was very much alarmed, Mr. Lincoln said, "The thing I fear about Stonewall Jackson is that he is a praying general; he prays before he goes into battle." A high tribute by the head of the Nation to that peerless soldier.

Mr. Lincoln had an abiding faith in God. Notice his statement at Springfield when he bade farewell to his neighbors on February 11, 1861, and called upon them to give him their prayers. Notice his statement in his first inaugural:

Is not a firm reliance upon Him who has never yet forsaken our favored land sufficient to adjust our differences?

Notice him in his second inaugural. His judgments are righteous altogether. Hear him saying to Brooks, "I would be the veriest blockhead if I thought I could get through with a single day's business without relying upon Him who doeth all things well."

I want to say to this body of legislators, from the standpoint of a close study of the life of Mr. Lincoln, that his was the most profoundly religious nature of any of our great Presidents. Why, then, you ask, did he not belong to a church? I answer you, I hope as a consistent member of the Methodist Episcopal Church, Abraham Lincoln was too great a soul to be circumscribed by the narrow denominational lines of the day in which he lived. [Applause.] I say it not in antagonism to churches, for I believe in them and I am a member of one of them. But the bitterness that was then felt between branches of the Christian church was such that it was pretty hard for a man of that great heart of his to subscribe to a good deal of this bitterness. But let no man, because of this, quote him as against religion. He was profoundly religious, and always gave his voice and influence to the things for which the church stands.

He once said:

Show me the church which writes over its portals "Thou shalt love thy God with all thy strength of heart and mind, and thy neighbor as thyself," and I will join that church.

I close with this suggestion: As Mr. Lincoln was closing his career he was more concerned about the reconstruction of the seceded States than any other one subject. He made his last speech from the Executive Mansion on the 11th of April. He spoke about reconstruction, and said that that was one of the things that had most deeply impressed his heart during all these years, and then he said, in substance:

Let us not now enter into a controversy as to whether the States are in the Union or out of the Union. That question can only have the mischievous effect of dividing our friends. We all admit that the States are out of their practical relations with the Union. Let us strive to reinstate the relation as it existed before the war, and when that is done, then let us each one alone take pleasure, if there is any pleasure in it, in seeing whether they were ever away from home. Finding themselves safely at home, it would be utterly immaterial whether they had ever been abroad. Let us not bring that up now, for it can only end in mischief.

To the South he said:

It may be my duty to make some new announcement to the people of the South.

That announcement was never made. Four days later the bullet of the assassin closed his lips forever, and he was not to make an

announcement on that or any other great subject. But the one situation he yearned so much to see adjusted was the preservation of the Union as it had been before 1861. His death removed the one insurmountable obstacle to the success of radical measures in reconstruction. As I once said before, his rare magnanimity, illumined by an intellect equally rare, peculiarly fitted him to pilot the ship through the rough breakers that hugged the shore of nationality as he had safely brought it through the stormy Civil War. He was broad enough to know that too much national prerogative was despotism, and too much State rights might lead to anarchy among the States. I want to say that when the bullet of the assassin laid him low the best friend the South had in authority had fallen. [Applause.] Jefferson Davis said that next to the fall of the Confederacy the death of Lincoln was the greatest stroke the South ever received.

What a beautiful thing it is to contemplate the change of attitude toward him. Fifty years ago many a child of that day in the North was rocked in the cradle over which was sung the lullaby:

Old Abe Lincoln is dead and gone,
Hurrah! Hurrah!

Then the people were divided. To-day, 50 years after, our differences, born in the heat of a great national issue that precipitated war, are no more. His name is spoken in reverence by a reunited Nation, whose finest product is embodied in the great war President.

His yearning for the cessation of strife was in his every impulse. When the scene of Appomattox had passed, no one was so happy over the prospects of a return to peace as he.

But in a moment of rejoicing all was changed. Another tragedy was to be added to the series of tragedies. It was not his to live to see the fruits of the war, and to so guide its reconstruction as to rebuild safely with the highest honor to all our people. No; it was his to die. He was surrounded by friends, including his official family, as his spirit went home to its God, with whom it had kept so closely throughout the dark hours of civil war.

Stanton, at the head of the bed, now virtually the head of the Nation, Seward having been attacked in his sick room, broke the silence of death when he said, "Now he belongs to the ages."

The next day the great Secretary, who had so often differed from his great chief, looked upon his face, now asleep in death, and pointing his hand toward him said, "There sleeps the mightiest man that ever ruled a nation."

It was thus left to one of his critics, who differed with and yet loved him, to pass the highest encomium upon him.

In my judgment Abraham Lincoln is the truest type of the American statesman, the broadest in comprehension, the sweetest in disposition, the deepest in humanity of secular history. And now as we are facing to-day as great problems as ever faced him in his day, let us renew our obligations to our common country by pledging ourselves in his words our last full measure of devotion in the hope that the Government of the people, by the people, and for the people shall not perish from the earth. [Applause.]

Mr. GOULDEN. Mr. Speaker, I ask unanimous consent to address the House for two minutes.

The **SPEAKER**. The gentleman from New York asks unanimous consent to address the House for two minutes. Is there objection? There was no objection.

Mr. **GOULDEN**. Mr. Speaker, I feel that I should apologize to the House, as well as to the distinguished gentleman from Ohio, who has just completed his splendid patriotic address. Perhaps I am the only man on the floor of the House who heard Lincoln's famous speech at Gettysburg. [Applause.] That is my excuse for injecting myself at this time. By the grace of God and the will of the Speaker, nine veterans of the Civil War, six who wore the gray and three who wore the blue, all that are left of that memorable struggle, were honored by an appointment to accompany the Vice President and himself to the fiftieth anniversary of the great Battle of Gettysburg last July. While standing there on the memorable spot on which Mr. Lincoln stood 50 years before, I heard that famous speech of his. I first heard—and I can assure my colleagues that I was tired and weary—the splendid oration of Edward Everett, a brilliant speaker of that day, which lasted two hours. I knew, in my youthful impatience, I hoped that he would finish quickly so that the great war President might be heard, but he did not. He truly made a magnificent speech. I want to ask, Mr. Speaker and gentlemen of the House, how many of you can recall or could even repeat even portions of the beautiful oration of Edward Everett on that occasion, while on the other hand the brief, touching speech of President Lincoln is known to every school-boy and every schoolgirl, not only in this country but in many others. I stood within 30 feet of the platform and heard the President. As Mr. Lincoln stepped to the front, with that pathetic, sad look upon his face, the great audience of 25,000 people started an applause loud and long. A smile went over his countenance, and when he smiled you forgot the homeliness of his rugged countenance. He then made that famous address of his, which lasted less than three minutes, making a most profound impression on his listeners, at least one-half of whom could hear him distinctly. I saw Edward Everett step over and shake his hand, but I could not hear what he said; but we are told what he did say was that he would give his two hours of effort for the three minutes of Mr. Lincoln; and he was right. That was a great occasion, upon a battle field that more than 200,000 as brave men as ever lived fought three days for what they thought was right. It was one of the greatest in the history of this or any other Nation, marked to-day by more than 500 splendid monuments.

We do well, Mr. Speaker to call to mind the deeds of our great men, those who have so greatly aided in making the Nation a world power, respected everywhere, and I think none carries with it a greater lesson of patriotic sentiment so worthy of emulation than that of the lamented martyred President of the United States—Abraham Lincoln. [Loud applause.]



PUBLICITY IN THE MAKING OF GOVERNMENT CON-
TRACTS.

L E T T E R

FROM

THE SECRETARY OF WAR,

TRANSMITTING

DRAFT OF BILL TO PROVIDE FOR PUBLICITY IN THE MAKING OF
GOVERNMENT CONTRACTS.

MARCH 16, 1914.—Referred to the Committee on Military Affairs and ordered to be
printed.

WAR DEPARTMENT,
Washington, March 11, 1914.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith draft of a bill to provide for publicity in the making of Government contracts, the enactment of which would repeal sections 512, 513, 514, and 515, Revised Statutes (which require that all contracts entered into by the War, Navy, and Interior Departments be filed in the returns office of the latter department), as well as sections 3744–3746 of the statutes relative thereto.

This matter was made the subject of an investigation by the departments mentioned in 1912, as shown by reports contained on pages 457–459 of the Reports of the President's Commission on Economy and Efficiency. (See H. Doc. No. 670, 62d Cong., 2d sess.)

The proposed legislation has also been investigated and passed upon favorably by a board representing the several departments concerned, and the Department of the Interior, in letters of November 8, 1911, and March 2, instant (copies herewith), concurs in the views of said board.

As it appears to be conclusively shown that the present law enforces a large amount of labor without compensating benefit, the enactment of the proposed legislation is respectfully requested.

Very respectfully,

LINDLEY M. GARRISON,
Secretary of War.

[Inclosure.]

DEPARTMENT OF THE INTERIOR,
Washington, November 8, 1911.

The SECRETARY OF WAR.

SIR: The department is in receipt of your letter of October 6, 1911, relative to the filing of copies of contracts made by the War Department and its officers in the returns office, established in this department under existing law, and expressing your opinion why the law should be repealed.

While I concur in the view expressed in your letter that compliance with the present law enforces a large amount of labor without compensating benefit, nevertheless, until repealed, it is the duty of this department to see that its provisions are complied with.

I shall be pleased to cooperate with you in the effort to secure its repeal and, in this connection, I inclose for your consideration and such suggestions as you may care to make in the premises, copy of a bill prepared for submission to Congress by my predecessor, having as its object the repeal of those provisions establishing the returns office of this department and proposed legislation in its stead.

Very respectfully,

CARMI A. THOMPSON,
Acting Secretary.

DEPARTMENT OF THE INTERIOR,
Washington, March 2, 1914.

The SECRETARY OF WAR.

MY DEAR MR. SECRETARY: I am in receipt of your communication of January 26, 1914, in which you call my attention to the fact that the law requiring all contracts entered into by the Secretary of War to be filed in the returns office of this department retards and embarrasses efficient service in the various bureaus of your department, and say that an effort to repeal the law by inserting a legislative provision in the appropriation bill did not meet with success. You ask the cooperation of this department in securing the enactment of legislation to eliminate a provision of law which, in your judgment, serves no useful purpose.

In response I have to invite your attention to department letter of November 8, 1911, relative to this subject, copy inclosed. I also inclose a copy of the draft of proposed legislation mentioned therein. As will be seen, it was the purpose of said proposed legislation to repeal sections 512, 513, 514, and 515 of the Revised Statutes of the United States, by which the returns office was established, and which requires all contracts made by the War, Navy, and Interior Departments to be filed in that office.

A copy of this proposed bill was forwarded to the Navy Department with letter of February 12, 1910. No action was taken by either of the departments looking to the introduction of said proposed bill in Congress.

I would have no objection to the repeal of the sections above mentioned and the abolishment of the returns office if legislation

along the lines of that contained in said draft of proposed bill were enacted.

Very truly, yours,

A. A. JONES,
First Assistant Secretary.

A BILL To provide for publicity in the making of government contracts.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That sections five hundred and twelve, five hundred and thirteen, five hundred and fourteen, and five hundred and fifteen, Revised Statutes, be, and the same are hereby, repealed and the following provision is made in lieu thereof:

It shall be the duty of the head of every executive department, or other establishment not under any of the executive departments or of their officers under them appointed or authorized to make contract on behalf of the Government, to cause such contract to be reduced to writing and signed by the contracting parties with their names at the end thereof, except as otherwise authorized by law. A copy of such contract, together with the originals of all advertisements, bids, offers, and proposals, made to obtain the same, shall be filed and kept open for inspection in the bureau or office of the executive department or other establishment not under any of the executive departments, having supervision of the business to which the contract relates. The head of each executive department or other establishment shall make rules and regulations to govern the filing and inspection of the papers herein referred to: *Provided*, That the requirements for filing, inspection, and furnishing copies shall not apply to any contract or related paper which, in the opinion of the head of the department or other establishment, is of such a nature that the publishing thereof would be contrary to the public interest.

SEC. 2. That the Secretary of the Interior shall, upon the request of the Secretary of War or the Secretary of the Navy, respectively, transmit to the department of which the Secretary making the request is the head, all returns made in connection with contracts that have not been fully performed. Such returns when received shall be filed and kept open for inspection in the same manner as returns under other contracts provided for in section three hereof.

SEC. 3. That it shall be the duty of every officer who signs a contract on behalf of the Government to transmit within thirty days after the signing thereof to the bureau or office designated under section one of this act as the depository of such contract, all papers required by said section to be filed and kept open for inspection, and he shall certify that the same includes an exact copy of a contract made by him personally with the contractor; that he made the same fairly, without any benefit or advantage to himself or knowledge of any such benefit or advantage corruptly to the said contractor, or any other person, and that the papers accompanying include all those relating to said contract. A certified copy of the papers and certificate so transmitted shall, subject to the exception made in section one hereof, be furnished to any person paying therefor at the rate of fifteen cents for every hundred words or fraction thereof.

SEC. 4. Every officer who makes any such contract and fails or neglects to transmit the required papers within the time specified in section three, unless prevented by unavoidable accident or causes not within his control, shall be deemed guilty of a misdemeanor and shall be fined not more than \$500; and every officer who shall knowingly make a false or fraudulent certificate as to the papers or copies of papers required to be made by him under this act shall be liable to the pains and penalties provided in section one hundred and six of the act to modify, revise, and amend the penal laws of the United States, approved March 4, 1909.

SEC. 5. A copy of the papers transmitted and of the certificate made under the provisions of this act, when authenticated by the seal of the department, or in the usual manner of authenticating copies of papers by any other establishment not under an executive department, shall be evidence in any prosecution against any officer for a violation of the provisions of this act.

SEC. 6. That so much of section thirty-seven hundred and forty-four, thirty-seven hundred and forty-five, and thirty-seven hundred and forty-six of the Revised Statutes as requires the heads of the executive departments therein mentioned to cause returns of contract to be made to the returns office of the Interior Department be, and the same is hereby, repealed.

EXPOSITION AT CITY OF PANAMA.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

**COMMUNICATION FROM THE SECRETARY OF STATE IN RELATION
TO THE INVITATION FROM THE GOVERNMENT OF PANAMA TO
THIS GOVERNMENT TO PARTICIPATE IN AN EXPOSITION AT THE
CITY OF PANAMA.**

MARCH 17, 1914.—Referred to the Committee on Foreign Affairs and ordered to be printed.

To the Senate and House of Representatives:

I transmit herewith a report from the Secretary of State in relation to the invitation from the Government of Panama to this Government to participate in an exposition which is to open at the city of Panama on November 3, 1914, and I join with the Secretary of State in strongly recommending the authority of Congress for the acceptance of the invitation and an appropriation of \$100,000 to enable suitable participation by the United States.

As the exposition will open as early as November 3 next, prompt action by Congress on the recommendation is essential to proper and adequate preparation for the participation.

WOODROW WILSON.

THE WHITE HOUSE,
Washington, March 17, 1914.

THE PRESIDENT:

I submit herewith a translation of a note from the minister of foreign affairs of Panama, extending on behalf of the Government and people of Panama an invitation to the Government of the United States to participate in a national exposition commemorative of the discovery of the South Sea by Vasco Nunez de Balboa, which is to open at the city of Panama on November 3, 1914, and to remain open until April 30, 1915. It will be seen from the decree of June 17, 1913, men-

tioned in the minister's note and a translation of which I also inclose, that the program of the exposition contemplates exhibits of agriculture, hunting and fishing, mining, live stock, liberal arts, fine arts, industrial arts, history, education, and public instruction. Special stress is laid by the Panama minister of foreign affairs upon the opportunity which the exposition will present for the display of our modern agricultural machinery, and he points out that by class 59 of group 18 a special space is assigned for exhibits relating to the Panama Canal.

Mr. Richard L. Metcalf, head of the department of civil administration of the Canal Zone, in addressing the chairman of the Isthmian Canal Commission on the subject of this exposition, states that investigation has convinced him that the exposition will provide an excellent opportunity for the Government of the United States to advance its relations with the South American countries, and Col. Goethals, in forwarding Mr. Metcalf's communication to the Secretary of War, agrees that the exposition should be encouraged as affording an opportunity to American business men to promote trade relations with those countries with which easier communication will be established by means of the canal.

To my own mind, this exposition should offer an exceptionally good opportunity for making our products better known and for increasing our commerce not only in Panama and throughout South and Central America, but, in fact, the world generally, as the great number of persons who will doubtless come to Panama from all over the world to witness the opening of the canal will also visit this exposition; and I can not too strongly urge that advantage may be taken of this opportunity to exhibit, with as much completeness as is possible, not only American goods suitable for the Panama market, but for the markets of the world generally, and that as complete an exhibition as possible should be made of the scientific and educational activities of our Government and of our universities and schools. And aside from the benefits which the commerce, the manufactures, the sciences, and the arts of the country may derive from taking part in this exposition, an additional consideration why the United States should officially take part is shown in the liberal provision which the Government of Panama has made for participation in the Panama-Pacific Exposition at San Francisco.

I therefore recommend that the accompanying papers be laid before Congress and that that body be asked to authorize acceptance of the invitation and to enact a law authorizing the President to appoint a commissioner general to represent the United States in the proposed exposition and, under the general direction of the Secretary of State, to make all needful rules and regulations in reference to the contributions from this country, and to control the expenditures incident to the proper installation and exhibition thereof and to the preparation of the reports on the exposition.

I furthermore recommend that the sum of \$100,000 be appropriated out of any money in the Treasury not otherwise appropriated, to be expended, or so much thereof as may be necessary, for the erection, on land placed at the disposal of this Government without charge by the Panama Government, of a suitable building which may permanently stand as a bureau of information or a commercial museum to exhibit and draw at all times attention to the natural resources, the

industries and the commercial standing of the United States; and for an appropriate exhibit of the arts, industries, manufactures, and products of the soil and of the mines of the United States, and, as far as practicable, of the functions of the General Government, and an exhibit of such other articles as the President may direct, including an exhibit relating to the Panama Canal.

Respectfully submitted.

W. J. BRYAN.

DEPARTMENT OF STATE,
Washington, March 14, 1914.

[Translation.]

No. T 455.

DEPARTMENT OF FOREIGN RELATIONS,
Panama, August 5, 1913.

MR. SECRETARY: I have the honor to apprise your excellency that in commemoration of the discovery of the South Sea by Vasco Nunez de Balboa, the bold, the National Assembly of Panama voted to open a national exposition to which Spain, the neighboring countries, and the American manufacturers of modern agricultural machinery will be invited.

My Government has already concluded the preliminary arrangements for that exposition and I deem it opportune to extend in its name and in that of the Panaman people the most cordial invitation to that celebration to the Government and people of the United States, to whom the Republic of Panama is bound by so many ties.

Your excellency will find the regulations and technical organizations of the exposition in the pamphlet entitled "Exposición Nacional de Panama," of which I have the honor to send you 50 copies under separate cover.

The general regulations and classification of exhibits contained in that pamphlet, clearly show the prime movers and historic, artistic and commercial scopes of the exposition; but I wish to say to your excellency that the National Exposition of Panama, although commemorative of the discovery of the Pacific, and such will be its predominating character throughout, will also be, from the date of its opening and the length of its duration, an important factor in the great celebrations that are being prepared in connection with the opening of the Panama Canal.

And so our national exposition which will be opened on the 3d of November, 1914, and will remain open until April, 1915, will offer its attractions to the thousands of visitors who after visiting the Universal Exposition of San Francisco in California will come to Panama to gain personal knowledge of the marvelous work of the canal then in operation.

From this it is clearly seen that the National Exposition of Panama will offer to the world not only the sight of a great historical celebration in memory of the famed Spaniard, Vasco Nunez de Balboa, discoverer of the Pacific Ocean, but also the opportunity to know the resources of this country which is destined to be in the near future a great commercial depot for all centers of production in America and Europe. In fact, when the canal is opened the Amer-

ican and European manufacturers and merchants must needs establish at Panama and Colon large stores of merchandise to enable them to provide promptly for the markets of Central America and the Far East; and those countries, in turn, will derive great advantages from sharing in the supplying of the steamers and carrying with ease to the markets of Europe and the eastern United States the Asiatic manufactures and surplus of the product of American soil.

It can not be denied that evolutions of so great importance and weight will have their starting point, their first note of development, in the National Exposition of Panama which to visitors and exhibitors will be a manner of object lesson, a practical demonstration of the wealth of our soil, the value of our lands, the opportunities for an easy life with which we have been favored by nature, and, above all, of the ample opportunities offered in our country for the establishment of roomy warehouses for natural products and manufactured articles that must be ready to meet the demands of commercial intercourse growing every day larger with the operation of the canal and the new openings it will bring to the prosperity of the world.

Hence the talk that is already heard about the expediency for some of the producing countries to erect on the grounds of our exposition substantial pavilions that may stand as bureaus of information or commercial museums to exhibit and draw at all times attention to the natural wealth, industries, and commercial standing of the nations they represent.

With this in mind my Government has the honor to offer to your excellency's Government the most fraternal adhesion and the most liberal terms, with special regard to the acquisition of land which is even now placed at its disposal without charge to the full extent needed for the erection of its official building and pavilions.

The American manufacturers of modern agricultural machinery will find in our national exposition an excellent opportunity to display their valuable products and may of course rely on my Government's good will for the better success of their labors at the exposition.

I further desire to say to your excellency that group 18, class 59, in the classification of exhibits, assigns in the regulations a special space for all that relates to the Panama Canal and that it would give us great satisfaction and honor if your excellency's Government would arrange in the most convenient manner to fill that number with an exhibit worthy of the Nation to which is due the happy crowning of the greatest and most prodigious feat of engineering in the modern ages.

I present through your excellency's medium the most cordial greetings of the Panaman Government and people to the Government and people of the United States of America with whom the Republic of Panama has bound its destinies, and avail myself of this opportunity to renew to your excellency the assurances of my most distinguished consideration.

E. T. LEFÈVRE.

THE SECRETARY OF STATE OF THE
UNITED STATES OF AMERICA,
Washington, D. C.

[Translation.]

DECREE NO. 30 OF JUNE 17, 1913, BY WHICH THE NATIONAL EXPOSITION COMMEMORATIVE OF THE DISCOVERY OF THE SOUTHERN SEA IS REGULATED.

The President of the Republic in use of his legal powers decrees:

ARTICLE 1. The National Exposition of Panama, commemorative of the discovery of the Southern Sea by the Adelantado Vasco Nunez de Balboa, will have for its principal objects: To exalt and honor the illustrious memory of the discoverer of the Pacific Ocean, to strengthen the bonds of union and friendship which exist between Panama, Spain, our mother country, and the kindred countries of this continent and show to the world the natural resources, industries, and commerce and civilization of the Republic of Panama.

ART. 2. The exposition will be held in the lands "El Hatillo" situated between the capital city and Old Panama. It will be opened November 3, 1914, and remain open until April 30, 1915.

ART. 3. The program will comprise the following sections, divided into groups and subdivided into classes:

1. Agriculture.
2. Hunting and fishing.
3. Mining.
4. Cattle, live stock.
5. Liberal arts.
6. Fine arts.
7. Industrial arts.
8. History.
9. Education.
10. Public administration.

ART. 4. The classification of the exhibitions in each section or branch will be the following:

FIRST SECTION—AGRICULTURE.

GROUP 1.—Large tropical cultivations.

- Class 1. Coffee.
- Class 2. Sugar cane and its products.
- Class 3. Cocoa.
- Class 4. Tobacco.
- Class 5. Corn in grain and manufactured.
- Class 6. Rice.

GROUP 2.—Products of general agriculture.

- Class 7. Cereals: Wheat, barley, oats, etc.
- Class 8. Farinaceous: Beans, chick-peas, peas, lentils, Naju, wheat, okra, etc.
- Class 9. Nutritious tubers: Potatoes, white and purple yams, sweet potatoes, yucca, chayote root, etc.
- Class 10. Tubers of agricultural and industrial use: Little yuccas, bitter yuccas, sweet yuccas, little sweet potatoes, etc.
- Class 11. Forage plants (leguminous and gramineous).
- Class 12. Oily plants: Seeds and products; linseed, sesame, castor-oil plant, "chan," peanut, sunflower, cashew, argemone, nut pine, vegetable fat, straw capes, "sapuyulo," coconut, Chile bark, aguacate, myrtle, seeds of "ayote," "pepitoria," "guicoy," "sapallo," olive (wild), "tariri," seed of silk-cotton tree, cotton seed, "napahuite," "coyol," soap root, etc.

GROUP 3.—Horticulture and gardening.

Class 13. Vegetables and garden stuffs: Cabbage, white cabbage, lettuce, cabbage and turnip, cauliflower, radish, beets, water cress, cucumber, mustard seed, leek garlic, turnip, sweet potato, tomato, eggplant, onions, garlic, hot red peppers, sweet red peppers, "chimbombo," parsley, spinach, celery, asparagus, chayote, pumpkin, cantaloupe, etc.

Class 14. Fruits of all classes: Orange, lime, lemon, sapodilla plum, mamme tree fruit, banana, cashew, medlar tree, custard apple, honeyberry, mango, plum, coconuts, nances, papaya, tree cactus, guava, caimito, inaja fruit, cherimoyer, red currant, pineapple, Castilian melon, fragrant melon and its kinds, watermelon, honey mesquite, breadfruit, granadilla, etc.

Class 15. Fruit trees: Saplings and seeds, grapevine runners, etc.

Class 16. Trees, plants, and shrubs of ornamentation.

Class 17. Plants in flower and fresh flowers arranged in artistic forms; various orchids.

GROUP 4.—*Forestal products.*

Class 18. Construction and cabinet woods, in pieces, with bark, polished woods, dyeing woods, woods, barks, and fruits of industrial use, palms, rushes, vegetable ivory, vegetable wax, bamboos, resins, balsam, honey, honeycomb, india rubber, latex, gum of native and foreign trees, camphor, etc.

Class 19. Fibrous plants: Common cotton, silk-cotton tree, balsam, murul, coconut (fiber, fruit, bark, bracts, and spathes), corozo, capulin, century plant (cultivated and spontaneous varieties, as pita floja, cheche, mesclal, henequen), majagua, guana, dagger and its kinds, pineapple (leaves), little pineapple (leaves), plantain (peel), bur of the teasel, tul (cibaque), ramie, straw, paxte or lufa, life wood, vegetable horse-hair, tow of masculine fern, common mallow, sansevieria, jute, linseed (flax) (stalks), rattan, etc.

Class 20. Tannic plants: Ronron, breakax, mangrove tree, campeche wood, dragon's blood, nacascoco, nance, walnut, caco, oak, llano, oak tree, conacaste, gall-nut, etc.

Class 21. Medicinal plants.

Class 22. Modern agricultural machinery.

Class 23. Rural economy and agrarian instruction.

SECOND SECTION.—HUNTING AND FISHING.

GROUP 5.—*Live or stuffed animals.*

Class 24. Animals of the forests.

Class 25. Animals of rivers and lakes.

Class 26. Animals of the sea.

GROUP 6.—*Leavings of animals.*

Class 27. Hides, tanned skins, shells, bones, teeth, horns, tortoise shell, pearls, coral, sponges, feathers of every class, etc.

GROUP 7.—*Industries related to these branches.*

Class 28. Tanned skins, sole leather, undressed sheepskin, combs, buttons, brushes, shell combs, brooches of tortoise shell, etc.

THIRD SECTION.—MINING.

GROUP 8.—*Metallic minerals.*

Class 29. Samples of gold, silver, copper, tin, lead, zinc, nickel, cobalt, iron, magnetite, hematite, limonite, siderite, pyrites, manganese peroxide, etc. Metallic remains from mines in operation, showing the quantity of metal per ton of ore, the extension, direction, and depth of the veins, the location of the land in which the mine may have been located, and the advantages which may be offered for its exploitation.

GROUP 9.—*Nonmetallic minerals.*

Class 30. Calcareous rocks, slate, clays, mineral paints, marbles, jaspers, granites, serpentine marble, malachite, onyx, kaolin, coal, lignite, graphite, peat, naphthas, petroleum, asphalt, and other mineral products of the national subsoil.

Class 31. Mineral waters: Sulphur waters, carbonic waters, saline waters, and any other class.

FOURTH SECTION.—LIVE STOCK.

GROUP 10.—*Cattle.*

Class 32. Holstein breed.

Class 33. Jersey breed.

Class 34. Durham breed.

Class 35. Native breed.

GROUP 11.—*Horses.*

Class 36. Imported horses.

Class 37. Horses born in the country.

GROUP 12.—*Mules.*

- Class 38. Saddle mules.
- Class 39. Draft mules.

GROUP 13.—*Pigs.*

- Class 40. Fat hogs.
- Class 41. Breeded hogs.

GROUP 14.—*Live-stock products.*

- Class 42. Cream, fresh milk, skim milk, condensed milk, whey, butter, cheese, cottage cheese, curd, cream cheese, hand cheese, pressed cheese, smoked meat of cattle and pigs, salted meats of both, ham, port sausage, sausage, large sausage, bacon, hog lard, beef tallow, salted fish.
- Class 43. Veterinary science.

FIFTH SECTION.—LIBERAL ARTS.

GROUP 15.—*Graphic arts.*

- Class 44. Printing and binding.
- Class 45. Linotyping and electrotyping.
- Class 46. Lithography, engraving, and pyro-engraving.
- Class 47. Artistic photography, photo-engraving.
- Class 48. Penmanship and map making.

GROUP 16.—*Decorative arts.*

- Class 49. Drawings, paintings, and ornamental sculpture.
- Class 50. Scenography.

GROUP 17.—*Mechanical arts.*

- Class 51. Watchmaking, gold or silver working, jewelry.
- Class 52. Wood carving, carpentry, cabinet making.
- Class 53. Smithery, casting, turning.
- Class 54. Marble work, pottery, and stone cutting.
- Class 55. Shoemaking, by hand and machinery.
- Class 56. Tailoring and hat making.
- Class 57. Cooperage, tinning, coppersmithing.

GROUP 18.—*Public works.*

- Class 58. Photographs, plans, designs, models, etc., of roads, aqueducts, public and private buildings, bridges, irrigation works, dikes, tunnels, railroads and street railways in exploitation, projects of new railroads, topographical and geodetical drawings.
- Class 59. Special section dedicated to the Panama Canal.

SIXTH SECTION.—FINE ARTS.

GROUP 19.—*Architecture.*

- Class 60. Projects and plans of public and private buildings. Designs, photographs and models of completed architectural works.
- Class 61. Construction materials. Cements, limes, hewn natural stones, artificial stones, mosaics, marble slabs, block cement, and reinforced cement, pipes, bricks, tiles, ornamental pottery.

GROUP 20.—*Sculpture.*

- Class 62. Figures in sculpture or in high or bas relief in marble, wood, plaster, clay, stone, wax, metal, ivory, etc.

GROUP 21.—*Painting.*

- Class 63. Oil paintings on cloth, wood, metal, porcelain, etc.
- Class 64. Water paintings, pastel, etc.
- Class 65. Crayon works, tinting china, pencil, carbon, color, pen.
- Class 66. Miniatures, enamels, soft engravings, fast water and other processes, photo oils, etc.

GROUP 22.—*Music.*

Class 67. Musical arrangement of the song dedicated to the discovery of the Southern Sea.

Class 68. Musical compositions of all classes.

Class 69. Musical instruments, ancient and modern.

Class 70. Musical concerts by the National Conservatory of Music and bands.

GROUP 23.—*Literature.*

Class 71. Works in prose on legislation and jurisprudence, sociology, general history, statistics, immigration, etc.

Class 72. Works of fiction, novels, stories, etc.

Class 73. Poetical compositions and works in general.

Class 74. Poetry allusive to the discovery of the Southern Sea by Vasquez Nunez de Balboa (song).

Class 75. Literary reviews and publications.

Class 76. Collections of diaries, bulletins, monographs, conferences, discourses.

SEVENTH SECTION—INDUSTRIAL ARTS.

GROUP 24.—*Elaboration of national products.*

Class 77. Flours of corn, wheat, rice, plantain, yucca, millo, sago, etc., and compounds, starch of yucca, boniato, and other similar plants.

Class 78. Elaboration of industrial products whose base may be cocoa, chocolate, etc.

Class 79. Elaboration of industrial plants whose base may be coffee, sugar cane, cereals, milk, or fruits of the country, muscovado, centrifugal sugar, sugar of honey, sugar-cane juice, cane juice, drained honey, common pan sugar, fine pan sugar, refined white sugar in molds, centrifugal refined sugar, aguardiente and sugar cane alcohol, cane vinegar, etc.

Class 80. Cigars and cigarettes.

Class 81. Pastry, confections, conserved fruits, vermicelli, and similar pastries, sirups, preserved fruits, etc.

Class 82. Cordage, paint brushes, whiskbrooms, chimney sweepers, brushes, feather dusters, brooms, etc., all of materials of the country. Oil or coconut grease, peanut, sesame, fig, aguacate, and seeds of cotton. Coconut lard, honeycomb, honey vinegar, beeswax, whitened wax for industrial uses.

GROUP 25.—*Diverse industries.*

Class 83. Alcohols and liquors of all classes, ciders, beers, and other fermented drinks, gaseous waters.

Class 84. Candles, soaps, matches, articles toilet, perfume, etc.

Class 85. Articles of leather of all classes, tanned, patent, etc.

Class 86. Saddlery.

Class 87. Threads and cloths, cotton, wool, silk.

Class 88. Hammocks, mats, sleeping mats, carpets, agave baskets, cord, fibers, barks, shavings, etc.

Class 89. Pyrotechnics.

Class 90. Screens, fans, canes, mirrors, curtains of wood, screens, frames, (beds), and any other article not comprised in the previous articles.

EIGHTH SECTION.

GROUP 26.—*National affairs.*

Class 91. Works on the discovery of the Southern Sea.

Class 92. History of Panama.

Class 93. Ethnography, historical antiquities.

Class 94. Geographical maps of Panama, ancient and modern, portraits of celebrated persons and individuals connected with the enterprise of Nunez de Balboa.

NINTH SECTION.—EDUCATION.

GROUP 27.—*Organization and scholastic regulation.*

Class 95. Fundamental law of public instruction, regulations, programs, methods, furnishings and utensils of primary, elementary, and graded instruction.

Class 96. Laws, programs, and obligatory methods for higher instruction.

Class 97. Private establishments of instruction, regulations, methods, furnishings, exhibition of works.

Class 98. Objects, methods, regulations, etc., for special artistic instruction.

Class 99. Objects, methods, regulations, etc., for special agricultural, industrial, veterinary, and commercial instruction.

Class 100. Models for scholastic buildings. Plans of studies.

Class 101. Studies on education and physical instruction.

Class 102. Studies on moral and intellectual education and instruction.

Class 103. Studies on instruction in manual arts.

Class 104. Kindergartens.

Class 105. Textbooks for primary and secondary instruction.

GROUP 28.—*Individual representation of establishments of instruction.*

Class 106. Special laws and regulations for the national institute, normal school for female teachers, national industrial school, public schools, graded, elemental and alternate, National Conservatory of Music and Declamation. Partial exhibits of each school.

GROUP 29.—*Manual works of men.*

Class 107. Scholastic museums, arts and trades.

Class 108. Plain drawing, lineal drawing, map making.

Class 109. Wood, cardboard and paper works.

Class 110. Works in iron, plaster, wax, etc.; relief maps.

Class 111. Paintings, oils, oleos, pastels, sepia, water, etc.

GROUP 30.—*Works of women.*

Class 112. Handkerchiefs, embroidered al "lauci" and two sided, with thread or silk, drawwork, etc.

Class 113. Pillows, wool, silk, velvet or any other class of goods; embroidered with silk, gold, silver, etc.

Class 114. Blouses for women, embroidered both sides, etc.

Class 115. Clothes for women, muslin, cambric, crape, plain, etc., embroidered in white or colors.

Class 116. Underwear for women, embroidered in white or colors, by hand or machine.

Class 117. Clothes for children, embroidered in white or colors, by hand or machine.

Class 118. Collars and mantillas for women, embroidered in gold, silver, silk, etc.

Class 119. Bed sets, comprising sheets, mattresses, coverings and pillows, embroidered in distinct goods.

Class 120. Table linen, embroidered Richelieu, white, colors, etc.

Class 121. Parasols, embroidered in silk, "guarandol," china cloth, etc.

Class 122. Handkerchief holders, embroidered through, "lauci" superimposed, etc.

Class 123. Religious ornaments, chasubles, men's cloths, altar ornaments, cibory curtains, and everything concerning this branch, embroidered in gold, silver, silk, etc.

Class 124. Lace trimmings, corset covers and neckties for women and children, handkerchiefs, aprons, baby carriers, small rugs, bedspreads, pincushions, piano covers, keyboard covers, pouches for small utensils, masks, etc.

Class 125. Laces, clothes, jackets, collars, mantillas, neckties, fans, samples, etc., of laces by bobbin, Galician, Venetian, English, Flanders, Brussels, Chantilly, Valenciennes, etc., bedspreads with lace crochet, network, etc.

Class 126. Artificial flowers, silk, worsted, shells, fish scales, cristal, paste, metal, wax, etc.

Class 127. Corsets of all classes.

Class 128. Hats and headdresses of all classes for women from materials of the country.

Class 129. Miscellaneous: Curtains, tapestries, baskets, shirts and underwear for men, watch cases, postal carriers, cigarette cases, writing desks, pocket books, albums,

jewel caskets, bird-feather work, pin cushions, and every similar article not enumerated in the previous classes.

Class 130. Patching and darning.

TENTH SECTION.—PUBLIC ADMINISTRATION.

GROUP 31.—*Ministry of government and justice.*

Class 131. Constitution, politics, and secondary laws of the Republic of Panama.

Class 132. Police branch: Regulation, organization of the corps, views of buildings, photographic groups of the chiefs, officials and subalterns of the police, daily service and dress uniforms.

Class 133. Firemen: Regulations and organization, materials and implements of the service, photographs of the quarters, portraits of the director general, commanders and officials and groups of the subalterns of the volunteer corps and permanent guards, work and parade uniforms, bands of the firemen.

Class 134. Mails and telegraphs: Organization and regulations of both services, postal and telegraph statistics, collections of postage stamps, old and modern, stamp commemorative of the discovery of the Southern Sea, projects for improvements in both branches, philately.

Class 135. The republican band: Organization and regulation of the corps, photographic group, musical concerts in conformity with programs prepared by the central committee of the exposition.

Class 136. Provincial government.

Class 137. Municipalities.

Class 138. Branch of justice, supreme court, circuit courts, municipal courts, public ministry.

Class 139. Public registry and registry of civil state.

Class 140. Civilization of the native race.

GROUP 32.—*Ministry of foreign affairs.*

Class 141. Organization and personnel of the ministry, laws and regulations of the branch, diplomatic and consular corps of Panama abroad, diplomatic and consular corps accredited to Panama, section of the protocol, views of legations and consulates and photographs of diplomats and consuls, works of legations and consuls in broadening international relations, and commerce, encouragement of immigration, etc.; treaties and conventions.

GROUP 33.—*Ministry of finance and treasury.*

Class 142. Laws, decrees and resolutions of the branch customs duties.

Class 143. Venal classes: Stamped paper, first, second, third, fourth classes; stamps, first, second, third, fourth classes.

Class 144. System of the collection of the rents of; distillation, tobacco, matches, cigars and cigarettes, choice cigars, imported alcohol, sugars, salt, coffee, etc., and the slaughter tax for cattle, wholesale and retail.

Class 145. Section of waste and exempt lands: Regulation, tax lists of property in the Republic, immovable and cattle, plans and maps of private and national properties.

Class 146. Inspections of ports and national customhouses.

Class 147. Movement of ships, views of finance offices in the ports and cities, photographs of the personnel of the ministry of finance and treasury and all its dependencies.

Class 148. Movement of the public treasury.

Class 149. Fiscal accounting.

GROUP 34.—*Ministry of public instruction.*

Class 150. Scholastic legislation, organization and personnel of the ministry of the branch.

Class 151. Personnel and material of primary schools and kindergartens.

Class 152. Regulation and personnel of superior schools, normal schools, school of arts and trades, National School of Declamation and Music, College of Commerce and Languages, National Institute, agricultural school, etc.

Class 153. Schools for natives: Regulation, personnel, and views of buildings.

Class 154. Inspections of public instruction.

Class 155. Popular libraries and scientific societies and literary associations of national control.

Class 156. Register of literary and artistic property.

Class 157. Scholarships for students at home and abroad.

Class 158. Normal school for boys; projects and preparatory works.

Class 159. Night instruction for workmen.

Class 160. Scholastic statistics.

Class 161. National scholastic warehouse.

Class 162. Regulation and management of the National Theater; views of the building.

Class 163. Regulation and personnel of the national printing establishment; typographical works and binding, ruling, etc.

GROUP 35.—*Ministry of public works.*

Class 164. Laws, decrees, and resolutions of the branch; contracts, existing industries, etc.

Class 165. Expositions: Documents, plans, preparations, and works on the national exposition commemorative of the discovery of the Southern Sea.

Class 166. National statistics: Demography, commerce, agriculture; statistical charts of each section; organic law and regulations on the subject.

Class 167. Patents and trade-marks; encouragement of agricultural colonies; mining laws and all concerning this branch.

Class 168. Sanitation and charity: Pest houses and hospitals, Bolivar Asylum, orphan asylum, Santo Tomas Hospital, regulations and photographic views of those establishments.

Class 169. Technical section: Plans of cities and cart roads, plans of public buildings, plans of schools and photographic views, plans and profiles of bridges and culverts, plans of cart and wagon roads, projects of railroads, plans of wharves and markets, material and machinery for construction of roads, studies for the canalization of the river "La Villa," exhibition of engineering instruments and drawing.

Class 170. Other dependencies of the ministry; Government stables, deposits for materials, ironworks and machine shops, photographic views of all sections.

Class 171. Accounting of the branch.

ART. 5. The organization, vigilance, and conservation of all branches and sections pertaining to the exposition will be in charge of a central committee formed by the director general and the section chiefs necessary, presided over by the secretary of public works.

THE EXHIBITORS.

ART. 6. Exhibitors will be towns, Governments, Provinces, municipalities, corporations, societies, or companies, private parties who present or remit objects for the exposition, thereupon accepting the obligations contained in the present regulation.

ART. 7. Exhibitors will be subject to the following rules:

(a) To send to the central committee, resident in the capital of the Republic, the object or objects which they may desire to present, duly packed, with the corresponding invoice which indicates the weight, size, and other conditions which distinguish them. Each package will be marked thus: "Exposition Nacional de Panama" (Exposition National of Panama).

(b) To send to the central committee a note of entry, arranged after model letter A, which goes at the end, of which note the committee will issue the corresponding receipt.

(c) To preserve the proof of the delivery of the note of entry, without which the objects exhibited will not be returned.

(d) To recover, in the time fixed by the central committee, the objects mentioned, after the exposition.

(e) To direct to the central committee before the 30th of December of the present year, advice they that intend to take part in the exposition, indicating the nature and number of objects they propose to present to the concourse, and the approximate space their exhibits will occupy.

THE OBJECTS EXHIBITED.

ART. 8. All objects exhibited will be considered the property of the exhibitor, will be delivered to the central committee, in conformity with rules a and b of article 7, and can not be retired until the exposition is closed.

ART. 9. The central committee will not be responsible for damages which the objects suffer during the exposition, as a result of superior force, accidental case or extraneous conducts; but will do all in its power to avoid damages and secure reparation for the loss.

ART. 10. All objects will be located in the place assigned to exhibitors and in conformity with the dispositions which the central committee dictates.

ART. 11. Objects which may become destroyed or deteriorated may be changed for similar ones, with previous permission of the central committee, during the time the exposition remains open.

ART. 12. During the exposition exhibitors may transfer articles exhibited, giving written advice to the central committee and being subject to that disposed in article 8.

ART. 13. Industrial concerns will have the right to manufacture within the exposition and sell to the public their products with authorization of the central committee and subjecting themselves to the regulation which the central committee may adopt concerning commercial speculations realized within the circuit of the exposition.

THE FOREIGN REPRESENTATION.

ART. 14. Spain and the countries of the Continent who may accept the invitation to take part in the National Exposition of Panama will have placed at their disposition the land they may request for the construction of their respective buildings within which they will install their exhibitions.

ART. 15. Each foreign representation will install in its official pavilion the services of sanitation, drinking water, light, and fire prevention, and maintain them at its own expense during the exposition, in conformity with regulations which the central committee will dictate on the matter.

ART. 16. All packages imported for the exposition will bear the mark "National Exposition of Panama" and indicate the section and group to which they belong.

ART. 17. Effects the importation of which is prohibited by the laws will be under the inspection of the central committee or an employee of customs who will be named for this purpose, and will remain subject to the special prescriptions on the matter.

ART. 18. Objects of foreign exhibitions which may obtain reward in the competition will be exempt from all tax; the exhibitors will also enjoy the privilege of importing, free of duty, the packing, glass cases, cabinets, etc., necessary to place the objects destined for the exposition.

ART. 19. Objects of foreign exhibitions which are not rewarded will be considered as in transit, and to dispose of them exhibitors must comply with the fiscal requirements.

ART. 20. Panamanian consuls will charge no fee for invoices issued or for certifications authorized or for any other requirement or work in which they intervene concerning the exposition.

ART. 21. Delegates of foreign Governments in the National Exposition of Panama will be considered as belonging to the diplomatic corps, and the heads or presidents of the delegations will enjoy the privileges of a chargé d'affaires.

THE DUTIES.

ART. 22. Objects which figure in the exposition, coming from any of the Provinces of the Republic, will be exempt from every tax. The packing, glass cases, cabinets, etc., which the exhibitors need to place their exhibitions will likewise enjoy the same exemption. The importation of these last will also be free of import duties.

ART. 23. Objects manufactured in the inclosure of the exposition and destined to the propagation of an industry and presented to the public will pay no tax.

ART. 24. The central committee will regulate taxes collected for lots of land for every class of private business, saloons, hotels, restaurants, refreshment stands, small shops, bazaars, theaters, cinematograph shows, panoramas, and every other amusement which it is desired to exploit within the limits of the exposition.

THE REWARDS.

ART. 25. Objects presented in the competition and which surpass for merit, utility, or importance will be rewarded by the qualifying committee established for this purpose.

ART. 26. Rewards to the exhibitors will be distinguished under the form of diploma, signed by the President of the Republic, the secretary of public works, and the director general of the exposition.

ART. 27. These diplomas will be of the following classes: Diplomas of grand premium, diplomas of gold medal, diplomas of silver medal, diplomas of bronze medal, and diplomas of honorable mention.

ART. 28. In addition to the premiums fixed in the previous article there will also be four special premiums in money which will be distributed thus:

(a) One of \$500 to the native author of the best song allusive to the discovery of the Southern Sea, in conformity with that established in article 3 of law 42 of December 13, 1912.

(b) One of \$250 for the best artistic, literary, or scientific work.

(c) One of \$750 for the best exhibition of agriculture, industries, or stock.

(d) A premium of \$250 for the best exhibition of women's works.

ART. 29. The diplomas for these special premiums will be signed by the President of the Republic, the secretary of public works, the director general, and the presidents of the foreign delegations accredited to the exposition.

THE JURORS.

ART. 30. For the purpose of this regulation in the part referring to the rewards, there will be qualifying jurors and a grand jury, whose organization will be determined in the following article, as well as their respective powers.

ART. 31. Each one of these sections comprising this competition will have a qualifying jury composed of as many jurors of group as the number of groups of the section.

ART. 32. The central committee will name the group jurors (judges) which may be necessary in each section; and the foreign delegations will have the right to name one qualifying juror for each 50 private exhibitors from his country, or one juror for all official exhibits in each branch, in the corresponding section, in case the number of private exhibitors does not reach 50.

ART. 33. The group jurors will be organized in the form of a qualifying tribunal, electing among themselves a president, a vice president, and a secretary, the rest remaining as members; and for the examination and valuation of the objects exhibited, it will be divided into class judges, designating also among themselves those necessary to judge the classes of each group.

ART. 34. The classifications of the class judges will be discussed by the group jury; and the reward authorized to the objects exhibited determined by a numerical majority of votes. The classification lists, signed by the president and secretary of the group jury, will be passed for definite approval to the grand jury treated of in the following article.

ART. 35. The grand jury will be the superior tribunal, charged with deciding the rewards of the exposition, according to the classifications granted by the group jury; and will also receive and hear appeals of exhibitors, for failure to comply with the classifications which should have been obtained. For this purpose it may order the reexamination of objects whose merit is disputed, and the decision which the grand jury dictates after said examination will be without appeal.

ART. 36. The grand jury will be composed: The secretary of public works, the presidents of the foreign delegations, the presidents of the group juries, and the central committee of the exposition.

ART. 37. The deliberations of the grand jury and the group juries will be secret; and the final decision will be decided by a relative majority of the members present in the session.

ART. 38. Exhibitors can not be judges in the branch of group in which the objects they present to the exposition are found. Neither can those persons be judges in the proper branch who are bound by close relationship or social affairs to the exhibitors.

ART. 39. The judges can not award two or more premiums of equal class to the same exhibitor for articles belonging to the same class.

ART. 40. The judges should make the examination of objects which may become destroyed or deteriorated as soon as the exhibitor requests it; but will reserve their vote until the time for making the general classification.

ART. 41. If an article, belonging to the same exhibitor, figures at the same time in two classes on account of having characteristics applicable to each one of them, and deserve premium in both, it will be judged only in the higher class. And if it should obtain the same classification in two classes, it will be awarded a premium only in one of them; that preferred by the interested party.

ART. 42. The central committee will fix the date on which the works of the judges will begin and the days on which the special competitions comprised in the exposition are verified.

ADMISSIONS.

ART. 43. General admission to the exposition during the hours fixed by the central committee will be 25 cents for each person, except children under 6 years of age, who will be admitted free. The committee may alter that price on extraordinary days.

ART. 44. Admission fees and all receipts as a result of the exposition will go into the specific treasury of the same, where on account of the receipts and expenditures of the exposition will be kept under the supervision of the ministry of public works. The competition having terminated the remainder of the funds and detailed accounts of the entire fiscal movement of the exposition will be sent to the treasury general of the Republic.

CENTRAL COMMITTEE.

ART. 45. The central committee will organize the national exposition and operate in the building which the ministry of public works sets aside for this purpose. It will draw up the regulations which in addition to the present it deems necessary, and dictate the dispositions which in its judgment it thinks convenient for the best issue of the competition. Everything referring or relating to the exposition depends on the central committee, including the personnel which for any reason it may have to occupy itself with.

ART. 46. The central committee has ample powers to treat with exhibitors personally on every matter relative to the exposition. The organ of its relations with the Government will always be the ministry of public works, on which it depends directly.

PROVINCIAL COMMITTEES AND SUBCOMMITTEES.

ART. 47. In addition to the central committee which will operate in the capital of the Republic, there will be a provincial committee in each capital of a Province, and a subcommittee in each town of the same.

ART. 48. The provincial committee will be formed of the governor of the Province, the mayor of the capital, and a prominent citizen of the same named by the first two.

ART. 49. The subcommittees will be formed thus: The mayor of the town as president, and three citizens of the locality, one of which will act as secretary and the other two as voters.

ART. 50. The provincial committee is charged with organizing, collecting, and sending to the central committee, through partial deliveries, all exhibitions under the jurisdiction of the Province; and will try by all possible means to interest private parties and municipalities in its dependency in favor of the exposition, in order that they may provide the products and objects which may increase the prestige of the region.

ART. 51. The provincial committee will also organize the subcommittees spoken of in article 49 and furnish through it to agriculturists and enterprises the grain for cultivations, instructions, and regulations which the central committee sends it on affairs of the exposition.

ART. 52. The provincial committees and subcommittees will be under the immediate direction of the central committee and ruled and governed by instructions it dictates; but henceforth remain empowered to name the commissions which in their judgment may be necessary for the best exhibit of the competition.

GENERAL DISPOSITIONS.

ART. 53. No tax will be charged for the use of the locality, packings or glass cases which the objects exhibited occupy in the sections or pavilions, provided they are not destined to commerce. Regarding everything concerning exhibitions, the exhibitors must confine themselves to the dispositions of the central committee.

ART. 54. No construction of any kind can be made within the lands of the exposition without previous permission and without previously presenting to the central committee the respective plans for its approval.

ART. 55. To enter the live-stock competition, it is an indispensable condition to present the brand of the breeder of the cattle exhibited or a certificate of the local authority signed by two competent witnesses that the animals or products proceed from the breeding place, ranch, or installation of the exhibitor.

ART. 56. The reward in money referred to in paragraph (c) of article 28 of this regulation can only be authorized to the live-stock section if the exhibitor presents the best group of fine cattle, composed of three brood cows, one bull of 3 or 4 years,

five calves of more than 1 year old, and two small bulls, all of fine race, born in the country and coming from the same stock farm.

ART. 57. The exhibitor will also have choice to the premium in money for horses who presents the best group composed of three mares, one stallion, two young mares, and two colts of 2 years born in the country, of good origin and from the same stock farm.

ART. 58. The diplomas of grand reward in live stock can only be awarded likewise to the one awarded the money premium to the exhibitor of cattle who presents the three best pairs of reproducers of the breeds for milk, butter, and meat of foreign origin born in the country. This reward will also be awarded to the exhibitor who, of horses, presents the best pair of imported reproducers.

ART. 59. The other premiums in live stock will be awarded in conformity with the following conditions:

Cattle.—To the best pair of tame work oxen, large and perfect, born in the country.

To the best pair of fat young bulls pastured in the pasture grounds of the country.

To the best dairy installation most productive of milk with the least number of cows and in which is maintained the best state of sanitation of the animals and cleanliness of the management.

To the best collection of fodders, green and dry, and to the best samples of grains and forage substances.

Horses.—To the best pair of reproducers born in the country, with the mark of the ranch.

To the exhibitor of a mare bred from a young mule born in the country.

To the best team of draft horses born in the country.

To the best team of saddle or draft mules born in the country.

Swine.—To the best pair of fat hogs and the best pair of brood hogs.

ART. 60. The central committee will regulate opportunely everything relative to the stay of live stock in the exposition grounds, their feeding and cleaning, and the care of sick animals by the veterinary of the exposition.

ART. 61. Fifteen days before the close of the competition the exhibitors will fix in front of the objects reward cards stating the rewards obtained.

ART. 62. The central committee will publish monthly an exposition bulletin, in which will be reviewed the most notable events which have taken place and in which the amusements and shows to take place in the following week will be announced.

ART. 63. Every construction belonging to foreign delegations, colonies, societies, companies, or private parties must be removed by the owners in the time fixed by the central committee, so as to leave the lands completely free and clean of all material and dirt.

ART. 64. The secretary of public works will endeavor to secure from navigation and railroad companies a reduction of freight and passenger rates for the personnel and objects destined for the exposition; and to the foreign delegates there will be offered in the country every possible facility for the successful exit of their labors and that their stay in Panama may be pleasant.

Let this be communicated and published in the Official Gazette and in pamphlet. Given in Panama, June 16, 1913.

BELISARIO PORRAS.

The Secretary of Public Works:

R. F. ACEVEDO.



RELOCATION OF CERTAIN RIGHTS OF WAY IN THE DISTRICT OF COLUMBIA.

LETTER

FROM

THE SECRETARY OF WAR.

TRANSMITTING

COPY OF A BILL TO AUTHORIZE THE WAR DEPARTMENT TO ENTER INTO AN AGREEMENT WITH THE PHILADELPHIA, BALTIMORE & WASHINGTON RAILROAD CO. FOR THE ESTABLISHMENT OF BOUNDARY LINES AND THE RELOCATION OF CERTAIN RIGHTS OF WAY IN THE VICINITY OF THE ANACOSTIA RIVER, IN THE DISTRICT OF COLUMBIA.

MARCH 23, 1914.—Referred to the Committee on the District of Columbia and ordered to be printed.

WAR DEPARTMENT,
Washington, March 18, 1914.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: In connection with the work of reclamation of the Anacostia Flats and for the purpose of facilitating said work, it is necessary and desirable that a compromise agreement be entered into between the United States and the Pennsylvania Railroad Co. for the adjustment and settlement of their respective rights along the Anacostia River. The proposition involves a relocation of the tracks and property lines of the railroad company and an exchange of land and property rights between the company and the United States.

I have the honor, therefore, to transmit herewith draft of a bill to authorize the War Department to enter into an agreement with the Philadelphia, Baltimore & Washington Railroad Co. for the establishment of boundary lines and the relocation of certain rights of way in the vicinity of the Anacostia River, in the District of Columbia, and for other purposes.

The nature of the questions which have arisen, the necessity for their adjustment, and the character of the proposed agreement are fully set forth in the accompanying copies of correspondence on the subject between the Department of Justice and the War Department.

Very respectfully,

LINDLEY M. GARRISON,
Secretary of War.

A BILL To authorize the Secretary of War to enter into an agreement with the Philadelphia, Baltimore and Washington Railroad Company for establishment of boundary lines, and relocation of certain rights of way in the vicinity of the Anacostia River, in the District of Columbia, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in connection with proceedings now pending or which hereafter may be brought in the Supreme Court of the District of Columbia under the provisions of an act entitled "An act providing for the protection of the interests of the United States in lands and waters comprising any part of the Potomac River, the Anacostia River or Eastern Branch and Rock Creek and lands adjacent thereto," approved April twenty-seventh, nineteen hundred and twelve, and for the purpose of more promptly and effectually establishing the title and interests of the United States in certain of the lands and waters shown on the approved plan for the reclamation and improvement of the shores and flats of the Anacostia River, now on file in the War Department, the Secretary of War is hereby authorized to enter into an agreement or agreements in writing with the Philadelphia, Baltimore and Washington Railroad Company, for the relocation of all or any portion of its present rights of way or tracks in the vicinity of or crossing the Anacostia River or flats, in the District of Columbia, and for the exchange of lands and lands under water used or to be used in connection therewith or adjacent thereto, provided that any such relocated right or rights of way shall not exceed in width on top the width of the right or rights of way now possessed by said company, and the Secretary of War is further authorized and empowered to execute and deliver and receive and record on behalf of the United States such deeds, releases, quit claims, or other instruments purporting to convey or transfer title to, or easements in, any of such lands or lands under water as may be necessary to effectuate such agreements: *Provided*, That all such deeds, releases, quit claims, or other instruments, first shall have been submitted to and been approved as to matters of form and execution, by the Attorney General of the United States.

SEC. 2. The property or boundary lines described in each and every of the said agreements or executed instruments hereinbefore authorized, including the exterior or boundary lines of any rights of way agreed upon as now existing or as the same may be relocated shall be deemed to be the true and lawful property or boundary lines between the properties of the United States and of said railroad company and also shall be deemed to define and limit the proper and lawful rights of way of the latter, and such plat or plats as may be necessary to exhibit the same shall be prepared under the direction of the Secretary of War, and a copy thereof shall be recorded in the office of the recorder of deeds of the District of Columbia: *Provided*, That neither the agreements hereinbefore authorized, nor any of the deeds or instruments of conveyance, transfer, or location made in pursuance thereof shall involve the United States in any obligation for the payment of money and all expenses necessarily incurred in the acknowledging and recording of any of such deeds, instruments, or plats shall be borne and defrayed by said Philadelphia, Baltimore and Washington Railroad Company.

SEC. 3. That the right to alter, amend, or repeal this act is hereby expressly reserved.

DEPARTMENT OF JUSTICE,
Washington, D. C., January 3, 1913.

THE SECRETARY OF WAR.

SIR: As the result of questions which have arisen as to the rights of the Pennsylvania Railroad along the Anacostia River, certain propositions have been made looking to a relocation of the tracks and property lines of the road and of an exchange of land and rights between the United States and the railroad. On the south bank of the Anacostia River the proposition involves an exchange of land between the United States and the railroad, so as to straighten the property line as shown in red on the accompanying map. As an incident to this exchange of property it is proposed that the Pennsylvania Railroad shall surrender whatever riparian rights it may have along this shore. On the north side of the Anacostia River it is proposed that the two rights of way claimed by the company between the north bank of the Anacostia River and square south of 1080 shall be consolidated into one right of way 132 feet wide, and

that the United States shall convey to the Pennsylvania Railroad the land included within the limits of the original square south of 1080. It is also understood that the Pennsylvania Railroad will surrender all claims to riparian rights on the north bank of the Anacostia River with the agreement that in case the United States desires to sell to private persons any land now existing or which may be made abutting on its property line on the south bank of the Anacostia River or abutting on the original southern line of square south of 1080, the Pennsylvania Railroad shall have the first right to purchase. I inclose herewith a report on the subject which has been made to me by Stuart McNamara, Esq., special assistant to the Attorney General, in charge of litigation affecting lands along the Anacostia River, and call your attention to the questions which arise as to the method of securing a transfer of the title to the properties affected. It will be necessary to determine whether the Secretary of War has the power to execute the necessary deed or whether congressional action is required. I desire to be informed as to any precedents in your department for the action suggested to be taken, and to inquire if an arrangement along the lines suggested in Mr. McNamara's memorandum is deemed advisable by the War Department.

Very respectfully,

GEO. W. WICKERSHAM,
Attorney General.

FEBRUARY 15, 1913.

THE ATTORNEY GENERAL.

SIR: Referring to the proposition looking to an exchange between the United States and the Pennsylvania Railroad Co. of certain properties and rights of property along the Anacostia River in the District of Columbia, and replying to your letter of 3d ultimo, and its inclosure, copy of a report on the subject made by Stuart McNamara, Esq., special attorney, I beg to inform you that the proposed exchange appears to be desirable, and doubtless would be advantageous to the interests committed to the War Department, but I know of no existing statute under which this could be accomplished, and am of the opinion that congressional action in the premises would be necessary.

Very respectfully,

H. L. STIMSON,
Secretary of War.

MEMORANDUM FOR THE ATTORNEY GENERAL ON THE PROPOSED
COMPROMISE WITH THE PENNSYLVANIA RAILROAD.

JANUARY 8, 1913.

The circumstances under which the Baltimore & Potomac Railroad entered the District of Columbia and the city of Washington are set forth in the opinion of the Attorney General dated April 14, 1908 (26 Op., p. 577).

The rights of the Baltimore & Potomac Railroad were acquired by the Philadelphia, Baltimore & Washington Railroad, which is a part of the Pennsylvania system and will be hereafter referred to as the Pennsylvania Railroad.

The charter of the Baltimore & Potomac Railroad (act of Maryland Legislature, May 6, 1853) provided for the acquirement of a right of way of 66 feet. By the act of Congress of February 5, 1867, the Baltimore & Potomac Co. was authorized to enter the District of Columbia and given power to condemn a right of way, which, under the provision of law affirming the provisions of the Maryland charter, would be 66 feet in width. Entrance into the city and county of Washington was limited by the act of 1867 to a method to be determined, which was formulated in the act of March 18, 1869 (16 Stats., 1), into alternative plans, the route selected being the second one named in the act of 1869, beginning at a point on the northern shore of the Eastern Branch between South L and South M Streets. In the opinion of the Attorney General a right of way 66 feet wide was then acquired, extending from a point on the northern shore of the Eastern Branch and taking a curved direction along the said shore, constituting a perpetual easement on the land of the United States. Subsequently, in consequence of the act of May 14, 1888, according to the opinion of the Attorney General, the railroad company secured an additional right of way 66 feet wide, so that at the date of the opinion it held easements covering two rights of way—one curved and one straight—as shown on the accompanying plat, over such land of the United States as there might be from the point of entrance of the railroad on the northern shore of the Anacostia River.

On the south bank of the Anacostia River the Pennsylvania Railroad has acquired a considerable amount of land in fee simple either by deed or by condemnation under the acts of Congress. The parcels which are affected by the present consideration are (1) a tract of land acquired by deed from Thomas Seabrooke et ux., December 23, 1873 (liber 742, folio 400); (2) a tract of land acquired by condemnation proceedings in At Law 7346 from Sallie Smith, widow of John A. Smith; and (3) a tract of land acquired from Frederick W. Schaper et ux., April 17, 1888 (liber 1299, folio 464). All of these properties were acquired in fee, the condemnation stating specifically that the fee was required for railroad purposes, and a consideration was paid equivalent to the probable value of the fee at that time. There was, however, a reservation in the inquisition on the land of Smith of the use of two landings on the Anacostia River and rights of way thereto, and also the reservation of the perpetual use of a spring.

The Pennsylvania Railroad also claims title in fee simple to the so-called square south of 1080, bounded by Fifteenth Street east, Water Street, and South L Street. The dimensions given for this square in the original plan of the city are 344 feet on Water Street, 70 feet on Fifteenth Street, and 222 feet on South L Street. In consequence of filling along the front of the square on the river side of the original high-water line of the Eastern Branch there is now approximately an additional length on Fifteenth Street of 50 feet and, if the line of L Street is prolonged, an additional length on L Street of about 150 feet.

The area of this square as shown by the original plats was approximately 40,000 square feet, and the land included within the lines of

Fifteenth, Water, and L Streets at the present time measures approximately 90,000 square feet, an addition of 50,000 square feet.

To summarize: The rights which the Pennsylvania Railroad claim are a fee simple title on the east bank of the Anacostia River, including the riparian rights. This fee is probably subject to the servitude of two landings on the river front and rights of way thereto previously noted. From the westernmost line of the land claimed in fee simple, the Pennsylvania Railroad claims a right of way 66 feet wide across a tongue of land extending into the Anacostia River from its eastern shore. It also has permission for a bridge across the Anacostia River and two rights of way each 66 feet wide from the north bank of the Anacostia River to square south of 1080. It also claims title to original square south of 1080 in fee simple.

It will be seen upon an examination of the accompanying plat that the shore line of the Pennsylvania property in the parcel marked "2," represented by a broken black line, lies at a considerable distance inland from the present high-water line indicated by the solid black line. By dumping at various times subsequent to 1898, a total of over 200,000 square feet of land has been made on the bed of the Anacostia River exterior to the property line of the Pennsylvania Railroad. The parcel marked 3, containing approximately 24,750 square feet of land, although apparently less than the total area of land at that point, is probably practically identical, the difference arising in the method of locating the shore line, the whole of the parcel marked 3 being apparently natural, nonfilled land and equivalent to a similar projection into the Anacostia River shown on the plat of the property acquired from Sallie Smith.

The United States would probably have the right to recover the land in the parcel marked "2," and it is proposed to straighten the line between the United States and the Pennsylvania Railroad as shown by the broken red line so that the United States would transfer to the railroad that portion of the parcel marked "2," lying between the red line and the broken black line—that is to say, between the proposed line and the present property line of the Pennsylvania Railroad, having an area of 133,655 feet. In exchange for this it is proposed that the Pennsylvania Railroad shall transfer to the United States parcels marked 1 and 3, with a total area of 129,450 square feet; and that the Pennsylvania Railroad shall surrender its riparian rights, it being understood that this surrender is to be considered in connection with the proposed adjustment in square south of 1080.

There seems to be no adjustment necessary as to the right of way across the Anacostia River except to have the present situation affirmed, namely, that the tongue of land attached to the southern bank of the river is to be property of the United States in fee simple subject to an easement to the Pennsylvania Railroad of a right of way 66 feet wide. The transaction as to land on the south bank of the river involves also a consideration of the situation south of square 1080. It is claimed by the United States that the original commissioners of the city of Washington had no power to alienate this land and that the title is still in the United States. It would seem, however, that if this contention is supported the square would be subject to a perpetual easement for a right of way 66 feet wide, and that the United States would have only the naked legal title or reversion after nonuser in so much of the square as may be occupied

by this right of way. There is left, however, a portion of the original square amounting to approximately 14,000 square feet which is not affected by this easement and it is proposed that this shall be transferred to the Pennsylvania Railroad to complete the consideration for the transfer of the riparian rights on the southern bank of the Anacostia River.

While the opinion of the Attorney General held that the Pennsylvania Railroad was at that date entitled to two rights of way from the north bank of the Anacostia River to approximately square south of 1080, one of these rights of way—that known as the curved right of way—has been disused for a number of years, was until recently buried under accumulations washed from the bank above, and is only just now being put into a condition under which it would be possible to run cars over it. In all probability it will never be used for anything but a storage track and a question of nonuse seems to be indicated which it is proposed to waive in the settlement which has been suggested. Between the curved right of way and the straight right of way there is a tract of land inclosed in green lines on the accompanying plat which is undoubtedly land of the United States. It is proposed to remove the curved right of way over to this location, giving the Pennsylvania Railroad a right of way of 132 feet from the point where the curved right of way exists as a separate 66-foot location from the second or straight right of way. This change would result in the lessening of the space occupied by the Pennsylvania Railroad by about 3,000 square feet, due to the substitution of a straight for a curved line of track.

Upon the basis of the foregoing it is proposed that the Pennsylvania Railroad shall surrender all rights on the river side of the red line shown on the south bank of the Anacostia River; all claims except a 66-foot right of way from the westernmost line of its property on the south bank of the river to the beginning of the curved right of way; all claims except a right of way of a maximum width of 132 feet from the last-named point to the south line of L Street and shall disclaim all rights as to land affected by *United States v. Smith et al.* The condition is, however, made that if at any time the United States offers for sale made land south of square south of 1080, or north of the property line of the Pennsylvania Railroad on the south bank of the Anacostia River, the Pennsylvania Railroad shall have the option to purchase the same at a price which may be fixed by the United States.

It is proposed that in consideration of the foregoing the United States shall convey to the Pennsylvania Railroad all made land on the south bank of the Anacostia River between the red line shown on the accompanying plat and the property line of the Pennsylvania Railroad; shall assent to the final location of a 66-foot right of way across land made or to be made from the westernmost property line of the Pennsylvania Railroad to the point of divergence of the present straight and curved rights of way; to the location of a right of way beginning at the point of divergence just noted and extending on a curve equivalent to the present location of the curved right of way until it reaches a maximum width of 132 feet, which maximum width it shall retain until the north line of the 132-foot right of way intersects the north line of the present curved right of way, whereupon it shall proceed on a practicable curve until it intersects the north line of the present straight right of way at or near the south line of L Street;

that the 66-foot right of way, and so much of the right of way previously stated as may be necessary, shall proceed through made land south of original square south of 1080 until it reaches the original southern boundary of the said square south of 1080, and that the United States shall convey to the Pennsylvania Railroad the legal title to the land occupied by the present 66-foot right of way through the said square, and shall also convey to the Pennsylvania Railroad in fee all of the land north of the Pennsylvania Railroad's right of way and included within the lines of Fifteenth, Water, and L Streets. The exchange proposed is expressed in square feet of land and considerations as follows:

The United States surrenders:	Square feet.	The Pennsylvania Railroad surrenders:	Square feet.
On the south bank of the Anacostia.....	133,365	On the south bank of the Anacostia.....	129,450
In square south of 1080.....	14,000	Of its curved right of way on the north bank of the Anacostia (easement only)	3,000
In square south of 1080 now encumbered by easement of 66-foot right of way (legal title of).....	26,000		
	173,365		132,450

Option to purchase any land abutting on north property line on south bank of Anacostia and south property line of square south of 1080, which may be offered for sale to private persons.

All riparian rights and claims for making land and all right, title, and interest, except easements as herein defined, and fee simple title in original square south of 1080.

Upon the acceptance of this proposition, questions will arise as to the method of carrying it out. I have assumed that the title of the railroad company to the land is good for the purpose of alienation and is not subject to reversion in case the land is diverted from use for purposes of the railroad. The local counsel of the road seems to have no doubt that the inquisition on the land of Smith left no remainder or reversion of any sort in the original owner. The question of taxes and encumbrance remains, but these can be attended to on closing the matter as an incident to the final examination of title. I think it possible that it will be necessary to take steps to terminate the landing rights reserved to Smith under the inquisition, but it may appear on further examination that the railroad has merged this reservation by acquiring the remainder of the Smith property by later purchase.

It is possible that the arrangement in square south of 1080 may be made by means of a decree in *United States v. Smith et al.*, or it may be found that the Chief of Engineers has power to execute the necessary conveyance. The readjustment of the right of way on the north side of the river may require congressional action and it is possible that congressional action will be required for the exchange of land on the south side of the river. The first step would seem to be to secure a detailed plan of the proposed relocation of the lines of the Pennsylvania property, and I suggest that the Attorney General address the Secretary of War, stating the general tenor of the proposed relocation and also put the matter in the form of a letter to the Pennsylvania Railroad, suggesting that the company take up the question of a final location of its tracks.

I submit herewith drafts of such letters for your consideration.

Respectfully submitted.

STUART McNAMARA.



REPORT ON COAL IN ALASKA FOR USE IN UNITED STATES NAVY

A LETTER FROM
THE SECRETARY OF THE NAVY

TRANSMITTING

REPORT OF SURVEY AND INVESTIGATION BY
EXPERIMENTAL TESTS OF COAL IN ALASKA
FOR USE ON BOARD SHIPS UNITED STATES
NAVY, AND UPON COAL AND COAL FIELDS
AVAILABLE FOR SAID PURPOSE



APRIL 3, 1914.—Referred to the Committee on Naval Affairs and ordered
to be printed, with illustrations

WASHINGTON

1914



LETTER OF SUBMITTAL.

NAVY DEPARTMENT,
Washington, March 23, 1914.

SIR: The naval appropriation act approved August 22, 1912, makes provision for the survey and investigation by experimental test of coal in Alaska for use on board ships of the United States Navy, and for report upon coal and coal fields available for the production of coal for the use of the ships of the United States Navy and any vessel of the United States.

In accordance with the foregoing I have the honor to submit herewith the report required by the above-mentioned act.

Very respectfully,

JOSEPHUS DANIELS,
Secretary of the Navy.

The SPEAKER, HOUSE OF REPRESENTATIVES,
Washington, D. C.

This report is divided into the following chapters:

(1) Reports of the geologists and mining engineer and a general statement by Dr. J. A. Holmes, director of the Bureau of Mines, under whose direction and supervision was placed all the technical matters pertaining to the geological and mining investigations of the field, as well as the securing of a tonnage of representative coal sufficient for test on board the armored cruiser *Maryland* and at the Engineering Experiment Station, Annapolis, Md.

(2) Brief description of the transporting of the test coal from Trout Creek (Boring River fields) to tidewater.

(3) Summary of the tests of this coal conducted by the U. S. S. *Maryland*.

(4) Tests of a portion of the same coal at the Engineering Experiment Station, Annapolis, Md.

(5) General conclusions and opinions of the Navy Department on the suitability of this coal for use of the ships of the United States Navy and any vessel of the United States.

REPORT OF THE NAVAL COAL EXAMINATION IN THE BERING RIVER FIELD, AUGUST TO NOVEMBER, 1912.

GENERAL STATEMENT.

By J. A. HOLMES, Director Bureau of Mines.

ORGANIZATION AND PRELIMINARY WORK OF THE EXPEDITION.

The act making appropriations for the naval service for the fiscal year ending June 30, 1913, approved August 22, 1912, provided that of the total appropriation for depots for coal, etc., "\$75,000, or so much thereof as may be necessary, may be used for the survey and investigation by experimental tests of coal in Alaska for use on board ships of the United States Navy and for report upon coal and coal fields available for the production of coal for the use of the ships of the United States Navy and any vessels of the United States."

With a view to carrying out this provision of the act, the Secretary of the Navy requested of the Secretary of the Interior that the Bureau of Mines take charge of all the technical operations in connection with this investigation. This request was acceded to by the Secretary of the Interior, and the necessary instructions were issued to the Director of the Bureau of Mines.

After a conference between the Director of the Bureau of Mines and the Chief of the Bureau of Steam Engineering, it was decided that the investigations to be carried on during the late summer and autumn of 1912 should be concentrated in the Bering River coal field, and that later, if circumstances permitted, plans would be inaugurated for a similar investigation in the Matanuska coal field.

In organizing the personnel of the expedition to carry out the purpose of the above act, the following selections were made:

Mr. R. Y. Williams, a mining engineer of the Bureau of Mines, who had been for some years the manager of coal-mining operations, and who was thoroughly experienced in the modern methods for safeguarding the lives of the miners, was placed in charge of the technical operations of the expedition. Mr. Sumner S. Smith, another of the mining engineers of the Bureau of Mines, who had also been a practical miner and a superintendent of a coal mine, as well as mine inspector in Alaska, was assigned as general assistant to Mr. Williams.

Mr. C. A. Fisher, a mining geologist of extended practical experience in the examination of coal deposits under the Geological Survey, and who had already made an exhaustive preliminary examination of a large part of the Bering River coal field, was added to the expedition, and to him was assigned the special duty of selecting the beds of coal to be tested in connection with the naval coal expedition. Mr. W. R.

Calvert, another mining geologist of considerable experience in the coal work of the Geological Survey, and subsequently in private practice, was appointed as Mr. Fisher's assistant for this preliminary examination of the Bering River field and for the selection of the special coal beds to be investigated.

Dr. J. O. Downey, passed assistant surgeon of the navy, was selected by the Navy Department to accompany the expedition as disbursing officer and physician, and Dr. Downey was also intrusted subsequently with the work of transporting from the coal field to navigable waters at Controller Bay the coal which was mined for the practical working test on board a naval ship.

These engineers and geologists were sent to the Pacific coast about the middle of August, with instructions to examine such of the coal deposits being worked in the State of Washington as resembled most closely the coal deposits in Alaska, as a preliminary to the beginning of the Alaskan investigations. Prior, also, to their departure for the Bering River field, these engineers and geologists, with the Director of the Bureau of Mines, made a careful examination of several previous reports of examinations of the Bering River coal field, including the examinations by the geologists of the Geological Survey, those made by the mining engineers (especially that of Mr. A. H. Storrs) sent into the field by private companies, and also the records of the examinations made by the Director of the Bureau of Mines and by three practical managers of coal mining operations who accompanied him in an examination of that field during August, 1911: Mr. T. H. O'Brien, general manager of the Stag Canon Fuel Co., Dawson, N. Mex., Mr. F. W. C. Whyte, manager of extensive coal mining interests in Montana, and Mr. L. T. Woole, the manager of extensive coal mining operations in Wyoming. Abstracts of this information were placed in the hands of this party, carried by its members into the Bering River field, and were doubtless of great value in connection with their later examinations.

During the latter half of August, Messrs. Fisher, Calvert, Williams, and Smith made a joint examination of practically all of the important openings or prospect holes in the Bering River coal field, and finally selected as the place most promising for the subsequent investigations the beds of coal exposed on Trout Creek in and about certain preliminary openings made on one of the Cunningham claims.

Meanwhile, as soon as possible after the passage of the act making appropriations for the Navy's coal expedition, a practical and experienced mine foreman, with 25 coal miners and other assistants, were selected from the coal mines in the State of Washington, where conditions most closely resembled those in Alaska; seven horses and a complete outfit of provisions and prospecting equipment and supplies were brought together and made ready for shipment from Seattle to Katalla, the point of landing and entrance to the Bering River coal field, and this main body of the expedition reached Controller Bay on September 6. While the men and horses of the expedition were landed safely, unfortunately a barge containing nearly all the supplies and equipment of the expedition was lost, and the work of the expedition was thereby seriously delayed and crippled. However, such equipment and supplies as could be purchased in the town of Katalla were immediately secured, and the expedition proceeded to Trout

Creek in the Bering River coal field, to the place selected for the detailed examination.

For several weeks following the arrival of the expedition more extended prospecting was done at a number of different points on Trout Creek with a view to determining more carefully the nature and the extent of the coal beds, and also with a view to deciding which particular bed or beds should receive the more extended subsequent examination. Meanwhile, also, a thorough survey of the Trout Creek region was made.

During the month of November the work of the expedition was devoted almost entirely to the extraction of the large sample of coal, estimated at something more than 800 tons, which was obtained for a more extended, practical, subsequent test under actual working conditions on board a naval ship. By the end of November this work had been completed, and the men of the expedition were transferred to Wingham Island, at the mouth of Bering River. From this point they sailed on December 13, and arrived at Seattle on December 20.

DETAILED EXAMINATIONS IN THE REGION SELECTED FOR TEST.

The engineers and geologists, for guidance in their field explorations, were given the following general specifications as indicating the nature of the coal desired by the Navy Department:

(1) Coal with a fair proportion of lump, free from slate, and low in sulphur;

(2) With a volatile matter not lower than 12 nor higher than 22 per cent, and preferably between 14 and 18 per cent;

(3) With ash not higher than 8 per cent; and

(4) With high fixed carbon and a high heating value—i. e., above 14,000 British thermal units.

After a study of the chemical analyses of samples collected from the different localities, and the preliminary explorations described above, the engineers and geologists agreed upon three locations as those most likely to yield coal of the character just described. One of these was on Trout Creek, one on Carbon Creek, and one on the east slope of Kushtaka Ridge. The location on Trout Creek, known as the "Tenino" claim of the Cunningham group, was finally selected as that one of the three giving the best promise of satisfactory results. Mr. Fisher describes this particular location as follows:

This claim is traversed from north to south by Trout Creek, thus affording easy access to the coal, as there is a readily available passageway to and from tidewater. Moreover, there appeared to be at this locality the greatest quantity of available coal of the physical and chemical character required for Navy use. Opposite the Cunningham cabin on Trout Creek an 8-foot bed of hard coal had been opened, and about 850 feet farther downstream a 30-foot bed of similar coal had likewise been developed by a prospect entry. Nowhere else in the field could beds of such thickness, combined with the desired physical character, be found.

As the actual detailed examination of this region proceeded in connection with the extraction of the large sample of coal for subsequent ship test it was found that all of these beds upon which excavations were made proved to be lenticular or otherwise irregular in shape, and the coal proved to vary from high grade and fairly lumpy coal at certain places to a crushed coal, which at some points was high-grade and at other points a decidedly low-grade material.

EXTRACTION OF LARGE SAMPLE OF COAL FOR SHIP TESTS.

From the three most promising beds of coal at the location selected a sample, estimated at about 850 tons, was taken, and this coal was stored in sacks in the immediate vicinity of the openings, to be subsequently transported to tidewater and there placed on board ship for test under working conditions. The relation of these beds is shown on the accompanying sketch map.

From bed or tunnel No. 4 the larger portion (estimated at 674 tons) of this sample was extracted in a distance along the bed of about 120 feet, as it seemed to represent the best average conditions in that part of the Bering River field. This seam varied in thickness from 16 feet to 29 feet. It has an average dip of about 35° to the northwest. The character of a cross section of this bed is illustrated by the figures given in the three following cross-cuts or sections located about 30 feet apart along the length of the tunnel following the course of the bed.

Complete sections of seam opened in Tunnel No. 4.

Location.	First crosscut.	Second crosscut.	Third crosscut.
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Hanging wall.....	(1)	(1)	(1)
Shale, soft.....	3 4	6 7	2 0
Coal.....	16 9	8 3	4 6
Shale.....	1 7	0 7	0 6
Coal.....	1 2	2 6	3 4
Shale.....	0 7	8 2	0 2
Coal.....	0 9	1 10	1 6
Shale.....	3 0	1 0	5 8
Coal.....	2 0	6 0	4 0
Footwall.....	(2)	(2)	(2)
Total thickness of seam.....	29 2	22 11	24 3
Total thickness of coal.....	20 8	23 7	26 4

Shale.

Sandstone.

From bed or tunnel No. 5 (see map) a portion (estimated at 154 tons) of this sample was taken because of the excellent quality of the coal and because it was desired to prospect further in order, if possible, to determine the cause of the unusual hardness of this coal over a distance of 130 feet from this opening. This tunnel contained 591 feet of entry and several crosscuts, one of which followed the coal for 69 feet. The coal sacked in this tunnel was taken from two crosscuts, one 84 feet and the other 52 feet from the drift mouth, each driven to the left of the entry. The sections measured as follows:

From crosscut 84 feet from drift mouth.

Roof, shale:	<i>Ft. in.</i>	Roof, shale:	<i>Ft.</i>
Coal.....	2 8	Shale.....	9
Shale and dirt.....	8	"Charcoal".....	10
Coal.....	2 7	Floor, coal.	

From crosscut 52 feet from drift mouth.

Roof, coal:	<i>Ft. in.</i>	Roof, coal:	<i>Ft. in.</i>
Coal.....	4 0	Coal.....	1 3
Coal and dirt.....	1 7	Floor, coal.	

These sections, though they do not extend across the bed of coal, indicate the intimate association of shale and coal which is characteristic of many beds in this field.

From bed or tunnel No. 3 (see map) a quantity of coal (estimated at 20 tons) was taken to represent the average of the thinner seams of this field. It had been planned to obtain a large portion of the sample from this opening, but the sudden variations in thickness and the final complete thinning out of the coal discouraged further work.

The following sections, taken at 4-foot intervals, in this tunnel show the variations in the thickness of the coal bed:

	Section number.									
	7	8	9	10	11	12	13	14	15	16
Hanging wall, coal...	<i>Ft. in.</i> 5 6	<i>Ft. in.</i> 1 0	<i>Ft. in.</i> 2 2	<i>Ft. in.</i> 3 3	<i>Ft. in.</i> 3 6	<i>Ft. in.</i> 3 6	<i>Ft. in.</i> 3 10	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i> 0 1

As indicated in the above cross sections, the relative proportions and the relative distribution in the coal beds of shale and coal vary considerably in the same bed and within comparatively short distances in the particular beds of coal from which the sample for the Navy test was collected, while the coal near the surface appeared to be reasonably solid and free from shale. Within comparatively short distances from the surface the transition of the coal into shale and from shale into coal was in places so gradual and the crushed coal and black crushed shale resembled each other so closely that the separation of the two could not have been made except through washing operations.

In future mining operations such separation, under conditions like those just described, can easily be made through the use of mechanically operated screens and a washery. The ample and well-distributed supply of water and the climatic conditions in the Bering River region are such as make the operation of coal washeries there entirely feasible.

Because of the relations described above between the shale and the coal, and the lack of facilities for separating the two, the several hundred tons of run-of-mine coal, mined during the month of November and subsequently sent on board the cruiser *Maryland* for practical test, contained an abnormally large percentage of this black shale and earthy material. The engineers superintending this work have been criticized for allowing this shale to get into the large sample for test; but having selected with care the original location and the beds of coal to be sampled, they felt it to be their duty to collect this sample as run-of-mine coal, excluding from it only such material as would be ordinarily excluded in mining. Not having at hand the facilities for either screening or washing this sample, the engineers were not able to remove from it much additional waste material that would be removed easily by screening and washing facilities, such as would be installed for use in commercial mining operations in this region; nor, indeed, did they detect the fact that so large a percentage of this black crushed shale was incorporated in the sample.

The apparatus for making chemical analyses in the field was lost with the other supplies off Controller Bay, and therefore the chemical analyses which it had been planned would be made from day to day as the work progressed, in collecting the sample for test on board ship, could not be inaugurated until a new set of apparatus was supplied after the larger part of this sample of coal had been collected.

THE TESTS OF THE COAL AND THE INTERPRETATION OF THE RESULTS OF THESE EXAMINATIONS AS APPLIED TO THE BERING RIVER COAL FIELD.

The sample of coal taken in connection with the work described above was tested as run-of-mine coal on board the cruiser *Maryland* by the engineers of the Navy Department. There were no facilities either in the coal field or on board the steamer for washing or screening this coal. A portion of the coal, approximately 50 tons, was saved for subsequent tests, after being both screened and washed, at the naval testing station, at Annapolis, Md.

The transportation of this sample of coal from the Bering River coal field to navigable water and the subsequent tests of the coal on board the cruiser *Maryland* and at Annapolis are to be described elsewhere by the officers of the Navy Department.

In the use of these results it should be remembered, first, that they apply to but a limited portion of the Bering River coal field, viz, the Tenino claim of the Cunningham group of claims on Trout Creek; and, second, that the tests on board the cruiser *Maryland* represent tests of "run-of-mine" coal without (owing to lack of facilities) there having been separated from the sample much shaly and other earthy material which, under ordinary commercial operations, would be separated from the high-grade coal through screening and washing operations.

It should be remembered, further, in this connection that while this particular location for securing the sample of coal for test on board ship was regarded by the engineers as one of the most promising localities in the Bering River field for the collection of such a sample, there are many outcrops of coal in the Bering River region the samples from a number of which when submitted to chemical analysis indicate coal of as high grade as the best from which this large sample was collected for the Navy test.

While, therefore, the results of this test are disappointing in so far as this particular locality is concerned, the tests can not be regarded as exhausting the possibility of securing in the Bering River coal field coal suitable for use on board ship and for various commercial purposes. And it should be remembered that in ordinary mining operations ample facilities can be installed in different parts of the Bering River field both for screening and for washing this coal, thus improving the quality of the coal. For washing purposes there will be an ample supply of water and the climate is sufficiently mild to make washing practicable during nearly if not quite all of the year. The cost of such washing operations, including the value of the fine coal lost in washing, would probably not exceed 30 cents, and might be less than 20 cents, per ton of coal washed.

The fact that the coal from this particular bed yielded, as was reported to be the case, in the ship's furnaces an ash which slagged

on the grate bars and blocked the draft, furnishes no basis for condemning the entire coal field, as the ash from other coals in this field may behave quite differently; and even the ash from this coal might slag to a less extent in stationary furnaces for which a forced draft is not necessary.

The crushed condition of the coal at many of the outcrops in the Bering River field will increase the cost of mining and will lessen the value of the coal for some purposes, but it will facilitate the improvement of the coal by washing operations; and with the installation of modern mechanical stokers the more finely divided coal can be used to a much larger extent and with greater efficiency than was formerly supposed to be possible. This crushed coal can also be made readily available for coking or briquetting operations.

The following brief description of the Bering River coal field and its coals is reproduced from the report of the Alaskan Railroad Commission, 1913, page 57, paragraphs 2 and 3:

The Bering River field, which is one of the two Alaska fields containing the largest amount of high-grade coal, lies about 25 miles northeast of Controller Bay and is drained by Bering River, from which it received its name. It is sometimes called the Katalla and sometimes the Controller Bay field. The surveyed parts of the Bering River field embrace 22 square miles underlain by anthracite and about 28 square miles underlain by semibituminous and semianthracite coal.

The coal beds in this field which may be workable are from 3 to 25 feet thick, but through local swellings a much higher maximum thickness is attained. They are included in a great series of sandstones and shale, which are intensely folded and much faulted. In quality the coals vary from an anthracite, with an average of 81 per cent of fixed carbon, to a semibituminous, with 72 per cent of fixed carbon. The ash varies from about 2 to 10 or 12 per cent, the average from a number of analyses being from about 7 to 9 per cent. The bituminous part of the field includes much coking coal. The chemical composition of the bituminous coals of this region is similar to that of the best coals of the Appalachian fields, while the composition of the anthracite is but little inferior to that of the Pennsylvania anthracite.

COST OF THE FIELD EXAMINATIONS.

Both the cost of the field examinations and the cost of the transportation of the coal from the Bering River region to navigable waters were naturally higher than they otherwise would have been because of the lateness of the season at which the appropriation became available; the consequent rush with which preparations for the expedition had to be made; the loss of practically all of the supplies and equipment for the expedition in connection with the landing operations at Controller Bay; and the bad weather conditions throughout the entire period of the field work. The rains continued for almost this entire period.

The accompanying report by Mr. R. Y. Williams describes with more detail the field examinations and the mining conditions; and the report by Mr. C. A. Fisher describes in some detail the topographic and geologic conditions to be met with in any mining operations in this field.

The two attached maps (Nos. 1 and 2) indicate the location of the area in which the detailed examinations were made and the relations of this area to the topographic and geologic features of the Bering River region.

MINING CONDITIONS IN THE BERING RIVER FIELD, ALASKA, AS RESULT OF THE FIELD EXAMINATION OF THE UNITED STATES NAVY ALASKAN COAL INVESTIGATING EXPEDITION.

By R. Y. WILLIAMS, Mining Engineer.

ORGANIZATION.

The passage of the naval appropriation act by the Sixty-second Congress carried with it a provision for the investigation of Alaskan coal fields, which is as follows:

Depots for coal: To enable the Secretary of the Navy to execute the provision of section 1552 of the Revised Statutes, authorizing the Secretary of the Navy to establish, at such places as he may deem necessary, depots for coal and other fuel for the supply of steamships of war, \$500,000. That \$75,000 of said sum, or as much thereof as may be necessary, may be used for the survey and investigation by experimental test of coal in Alaska for use on board ships of the United States Navy and for report upon coal and coal fields available for the production of coal for the use of the ships of the United States Navy and any vessel of the United States.

Pursuant to this act, the Secretary of the Navy requested the Secretary of the Interior to authorize the Bureau of Mines to take charge, for the Navy Department, of all the technical operations in connection with the investigation. The Bureau of Mines, in carrying out this request, selected two mining geologists, C. A. Fisher and W. R. Calvert, and two mining engineers, R. Y. Williams and S. S. Smith, to conduct the necessary field investigations in Alaska.

The areas to be studied in this investigation were the Bering River and Matanuska coal fields, which are the two most extensive fields of southeastern Alaska known to contain high-grade coals. The Bering River field is about 25 miles northeast of Katalla, between Controller Bay and the base of the Chugach Mountains, and the Matanuska field is on the Matanuska River, about 60 miles above its entrance into Cooks Inlet.

The object of this expedition was to determine whether or not there existed within these coal fields workable beds of coal suitable for naval uses which might be set aside by the President as a coal reservation for the Navy Department, and from which the Navy could obtain thereafter a supply of high-grade steaming coal for its own needs. The physical and chemical requirements of a coal suitable for naval uses were described as coming within the following limits: (a) A coal with a fair proportion of lump, free from "slate," and low in sulphur; (b) volatile matter 12 to 22 per cent, preferably 14 to 18 per cent; (c) ash 2 to 8 per cent, preferably much nearer the low than the high limit; (d) fixed carbon high; (e) heating value more than 14,000 B. t. u., and near 14,500 if possible.

The plan of operation decided upon was to proceed first with the investigation of the Bering River field, during the autumn of 1912, and at the close of that season to transport over the snow and ice into the Matanuska field the necessary equipment for beginning early in the following year an investigation of that area.

The personnel and equipment for the expedition was so planned as to include two mining geologists, two mining engineers, all to be selected by the Bureau of Mines, a Navy Department paymaster and surgeon, an experienced mine foreman, to be selected from the State of Washington, an assistant mine foreman, trained in rescue methods and first-aid work, 36 miners, two mine blacksmiths, a few packers, 10 pack horses, camp equipment, mine cars, rails, all necessary tools and implements, subsistence supplies, etc.

Fisher, Calvert, Williams, and Smith, as duly authorized representatives of the Bureau of Mines, were each placed in charge of certain phases of the execution of this work.

C. A. Fisher and W. R. Calvert, holding appointments in the Bureau of Mines as consulting mining geologists, were held responsible for the selection of the localities and the bed or beds from which a large sample of coal for the naval test was to be taken, these beds to be prospected later with a view of determining their workability and suitability for naval use.

R. Y. Williams, mining engineer in the Bureau of Mines, and S. S. Smith, also a mining engineer in the bureau and mine inspector for Alaska, were placed in charge of the details of the expedition, and in special charge of the prospecting to be done and the extraction of samples of coal to be procured for the naval test.

J. O. Downey, passed assistant surgeon, United States Navy, and paymaster and the representative of the Navy Department, was placed in charge of all matters pertaining to the health of the camp, and also of the disbursement of funds for the maintenance of the expedition. He was also intrusted with the details of transporting the coal sample from the mine to Seattle.

The five persons named above were requested to cooperate in every way possible to insure the success of the expedition.

PRELIMINARY INVESTIGATION.

In advance of the main body of the expedition and while weather conditions were still favorable, a general reconnoissance of the entire Bering River field was made by Fisher, Calvert, Williams, and Smith. The primary object of this preliminary investigation was to examine all the known prospect openings and to ascertain what were the most promising areas and beds in which more detailed surface and underground prospecting might be carried on and from which the large samples of coal for naval test might be obtained.

Owing to the great interest manifested with respect to the Bering River coal field, a number of detailed investigations of the area have been made both by the United States Geological Survey and by mining engineers in private employ. Mr. G. C. Martin, of the Alaskan Division of the United States Geological Survey, spent the season of 1905 and part of the succeeding summer in a detailed study of the field, the results of his study being available for this expedition in United States Geological Survey bulletin No. 335. During the summer of 1909 C. A. Fisher spent 30 days in the examination of the Cunningham group of

claims for the Interior Department, the object of his investigation being to determine the coal or noncoal character of the respective claims. The results of his examination were published as part of the proceedings of the investigation by Congress, of the Forest Service, and the Interior Department. A. H. Storrs, a mining engineer of Scranton, Pa., also made a careful study of the Cunningham group of claims, the results of which were also published in the proceedings mentioned. In the summer of 1911 Dr. J. A. Holmes, Director of the Bureau of Mines, visited the field, and in connection with his general examination of the field obtained a number of coal samples for chemical analyses, took photographs, and made notes. A large amount of previously collected information was available, therefore, in regard to the Bering River field, comprising not only detailed data relative to the geology and coal occurrence, but also numerous analyses and carefully prepared maps.

With the above-mentioned information in hand, the preliminary survey party of four spent nine days (Aug. 24 to Sept. 1, 1912) on the ground investigating the entire field, the investigation reaching from the east side of Canyon Creek to McDonald's camp on Bering Lake.

The Bering River field is one in which rock exposures are rare except along the streams. The surface is almost entirely covered by a blanket of thick moss, grass, and brush above the timber line and below that horizon by a dense growth of spruce and hemlock in addition to the usual thick mantle of hill waste. Under these conditions it is evident that the best, if not the only, method of studying the coals of this field is by a detailed examination of all stream courses, along which the coal outcrops are in places fairly well exposed. Consequently all the large streams and their more important tributaries from Canyon Creek to McDonald's camp were followed and examined by the preliminary survey party during the nine days spent in the field. By this method those parts of the field presenting conditions that were classed as either undesirable or impossible were eliminated from the territory in which further and more detailed prospecting should take place.

After a thorough investigation of 150 surface outcrops and 22 tunnels, it was decided that the physical characteristics of the coal near the surface undoubtedly continue unchanged underground, that the coal is prevailingly soft, very much crushed and sheared, and that the areas containing coal of a character satisfactory for Navy purposes were restricted to not more than three locations: One on Carbon Creek in the vicinity of the English company's main camp; one unprospected location on the east slope of Kushtaka Ridge (also on the English company's claims); and one up Trout Creek on the Cunningham claims about 3 miles above the junction of that stream with Stillwater River. Of these localities, the last mentioned appeared to offer the most favorable conditions as regards geologic structure and quality and quantity of coal. The quantity available on the most favorable basis was only 25,000,000 tons, most of which was credited to two beds opened on the west side of Trout Creek, one being an 8-foot bed at station 51 and the other a 30-foot bed at station 9.

FIELD EXAMINATION.

Immediately following the arrival of the main body of the expedition on September 6, 1912, the detailed field examination on Trout Creek and the extraction of the large sample of coal was pushed as rapidly as possible until the completion of the work on November 29.

The detailed findings of the field examination may be presented as follows:

THE 8-FOOT BED, STATION 51.

This bed is exposed by a tunnel which follows the bed almost due west for 192 feet. A lens of coal over 8 feet thick extends from the portal to a point about 30 feet inside the tunnel where it pinches to 18 inches. The bed continues thin nearly to the face of the tunnel where the coal passes into carbonaceous shale between sandstone walls. On tracing the outcrop of this bed to the southwest, it was ascertained definitely that within approximately 600 feet from the tunnel entrance the bed is represented by 18 inches of coal and a considerable thickness of carbonaceous shale. At a still farther point the proportion of coal is even less, so that this particular bed is practically unproductive west of Trout Creek unless it so happens beyond the limit of present tracing that the coal replaces the shale, as is the case immediately adjacent to the stream bed. An endeavor was made to find the extension of this bed east of the creek but on account of the surface covering the attempt was unsuccessful, a drift of 10 feet failing to reach bed rock.

THE 30-FOOT BED, STATIONS 9, 30, 20 (1) AND (2), 17.

(Map No. 2.)

This bed was known locally as the "big vein" and had been more largely prospected than any of the Cunningham coals. The underground development consisted of a tunnel, tunnel No. 5, containing 591 feet of entry and several crosscuts, one of which followed the coal for 69 feet. This tunnel is on the west side of Trout Creek and 28 feet above the bed of the stream. On the surface on the east side of Trout Creek many old test pits were examined which seemingly had been dug in search of the continuation of the seam to the eastward.

The coal for a distance of 130 feet from the opening, station 9, was exceptionally hard for this field, lay at an irregular but steep dip, and had a strike with the direction of the tunnel. The thickness of the bed was very great, but its measurement was difficult because of the lenticular character of the bed at this point. In order to determine the cause of the unusual hardness over a distance of 130 feet from the opening and because of the excellent quality of the coal, a portion (estimated at 154 tons) of the large sample was taken from this tunnel, to which was given the number 5. The coal sacked in this mine was taken from two crosscuts, one 84 feet and the other 52 feet from the drift mouth, each driven to the left of the entry. The sections in these crosscuts measured as follows:

<i>Crosscut 84 feet from opening.</i>		<i>Crosscut 52 feet from opening.</i>	
Roof, shale:	Ft. in.	Roof, coal:	Ft. in.
Coal	2 8	Coal.....	4 0
Shale and dirt.....	8	Charcoal and dirt.....	1 7
Coal.....	2 7	Coal.....	1 3
Shale.....	9	Floor, coal.	
Charcoal.....	10		
Floor, coal.			

The decision, which resulted from the investigation of the Trout Creek coals by the advance party, was that the large seam showing in this opening should be well prospected on the west side of the creek, as appearances indicated that the district to the southwest of the tunnel No. 5 was one of the most regular in the entire field. It was recognized, however, that the local irregularity of the bed strongly indicated that the coal might be merely a pocket caused by the fault in the bed of Trout Creek, and that this geological phenomenon probably caused the local hardness noted near the entrance to tunnel No. 5. An attempt was therefore made to trace the outcrop of this bed to the southwest. Of the openings made, there were believed to be points on this coal, as follows (see map No. 2):

1. Station 30 (mine No. 4). Strike S. 63° 45' W. Dip 54° N.
Hanging wall. Shale.
Coal seam. Thickness, 16 feet 6 inches.
Footwall. Sandstone.
2. Station 20 (1) and (2). Strike S. 10° W.
Hanging wall. Shale.
Coal seam. Thickness, 18 feet.
Footwall. Sandstone.
3. Station 17 (1). Strike S. 18° W.
Hanging wall. Shale.
Coal bed. Thickness, 7 feet (upper 3 feet poor).
Footwall. Sandstone.

On October 23, at station 30, men were detailed to the work of opening a new tunnel on this "big vein," this opening being called tunnel No. 4. This work, together with the prospecting at other points, was vigorously prosecuted until November 7, when it was finally decided that this location was the only one along Trout Creek where the main part of the large sample of coal representative of the bituminous coals of the Bering River field could be obtained.

The following sections were taken at 4-foot intervals as each timber set was put in place and represent the changes at the face of the tunnel as the work progressed and as the 674 tons of coal were loaded for the Navy test. It should be remembered that the bed was thick and that these sections, except as noted below, do not show the entire thickness of the bed.

Tunnel No. 4.

	Set No. —										
	6	7	8	9	10	11	12	13	14	15	
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	
Coal.....	3	1 5	2 0	2 3	3 3	2 6	1 10		9		
Shale.....	1 7	1 0	1 2	2 10	1 9	1 2	1 7	2 0	2 2	2 3	
Coal.....	1 5	4 7	6	2 1	3 10	8	1 2	1 10	3 0	4 3	
Shale.....	1 0	4	10	7		1 10	7	2	3	1 1	
Coal.....	1 5	1 10	3 10	2 7		3 0	9	1 9	8	1 4	
Shale.....	5						3 0	5			
Coal.....	1 10						1 0	10	1 3		
Shale.....								1 6			
Bucks from set.....						62		40	60	60	

Tunnel No. 4—Continued.

	Set No. —									
	16	17	18	19	20	21	22	23	24	25
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Coal.....			4 4	1 10	2 4	1 4	1 2		4	1 0
Shale.....	2 2	1 2		1 0	1 6	1 3	1 0		2	1 0
Coal.....	3 2	3 6		6 0	1 0	6 6	6 9	8 10	6 0	2 10
Shale.....	5	8	6						11	1 4
Coal.....	8	6	2 5		2 2				1 10	3 0
Shale.....	3 0	3 0	1 0							
Sacks from set.....	50	49	64	88	94					

	Set No. —						
	26	27	28	29	30	31	32
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Shale, etc.....	5 0	5 0	5 6	6 6	6 3	.....	.....
Coal.....	4 0	4 0	3 0	2 0	8	4 0	5 0
Shale.....	.....	.....	.....	3	1 6	.....	.....
Sandstone.....	.....	.....	6	9	.....	5 0	3 0

Complete sections of bed opened in Tunnel No. 4.

Location.	First crosscut, A-B:	Second crosscut, C-D.	Third crosscut, E-F.
	<i>Ft. in.</i>	<i>Ft. in.</i>	<i>Ft. in.</i>
Hanging wall.....	(1)	(1)	(1)
Shale, soft.....	3 4	5 7	3 0
Coal.....	16 9	2 3	4 6
Shale.....	1 7	7	6
Coal.....	1 2	2 6	5 4
Shale.....	7	3 2	2
Coal.....	9	1 10	1 6
Shale.....	3 0	1 0	5 3
Coal.....	2 0	6 0	4 0
Footwall.....	(2)	(2)	(2)
Total thickness of bed.....	29 2	22 11	24 3
Total thickness of coal.....	20 8	12 7	16 4

¹ Shale.² Dandelion.

THE 6-FOOT BED AT STATION 28A.

This bed contained coal of fair quality and medium hardness and was prospected thoroughly because it appeared to contain coal that would satisfy the navy specifications. The examination showed, however, that the bed was of no value. At distances of 20, 40, and 100 feet long this outcrop from the showing of 6 feet of coal, this bed exhibited only 1 foot 8 inches of coal, 11 inches of coal, and 12 inches of carbonaceous shale, respectively. It was therefore necessary to abandon this bed.

THE BED AT STATION 28B.

At this point, Storrs states: "A very fine large seam could only be partially exposed owing to dirt slides." The reason for this was that the outcrop occurred at the crest of the ridge between the two gulches

and the seam had been overturned. As a result, what appeared to be the footwall at a distance of about 12 feet from the hanging wall was, in reality, the overturned hanging wall. At a point 20 feet lower we again opened this bed, found the footwalls and hanging walls in place, and obtained a measurement of 6 feet across the bed.

No further work was done on this bed because of the topographical position of the bed, which would have made it necessary to drive a tunnel several hundred feet before finding sufficient cover for normal mining of the bed.

THE "14-FOOT SEAM."

The "14-foot seam" was examined by Mr. W. R. Calvert and the writer on September 11. Our conclusion was that the bed measured 8 feet, was very much crushed, and contained considerable shale which would render the analysis high in ash. Storrs gives the seam average as 8.17 per cent ash.

No further work was done on this bed, as we had no chemical outfit and the possibilities of obtaining a suitable Navy fuel did not look good.

BED EXPOSED IN TUNNEL AT STATION 4(1).

(See map No. 2).

This tunnel was started in broken coal on the east side of Trout Creek, 53 feet above the bed of the stream. The drift struck a fault 13 feet from the entrance and was deflected 15° to the south, a direction which it continued 24 feet, making the total length of the tunnel 37 feet.

The face of this drift was in sandstone, shale, and drag owing to a fault. The strata lay nearly flat, the dip being broken, but with a tendency toward the north. The measures to the north of the opening showed a broken and sharply folded condition which would cut off coal on dip.

It was deemed inadvisable to do any prospecting on this exposure.

SEAM EXPOSED IN TUNNEL AT STATION 4 (2).

(Map No. 2.)

The direction of this tunnel was $N. 76^{\circ} W.$ The drift continued 21 feet to a cave-in and seemingly 15 feet beyond it. There was a small amount of coal on the hanging walls (or normal footwall). The dip was $52^{\circ} S.$, and the strike $N. 76^{\circ} W.$

The coal is on the south leg of an anticline, the apex of which is seemingly in the gulch about 150 feet from the tunnel opening. Broken carboniferous shale appearing at the apex is probably connected with the coal in the drift.

The broken condition of the strata and the reverse dip proved this horizon unproductive.

SEAM EXPOSED IN TUNNEL AT STATION 207.

(Map No. 2.)

The rocks at the portal of this tunnel appear to have the normal dip and strike, but the bed farther in the hill has an irregular strike, as shown by the direction of the tunnel which follows the strike of

the coal. The thickness of the bed is irregular and averages about 18 inches of dirty coal. At the face the strike is N. 85° E. and the dip 36° N.

The irregularity and small size of the bed discouraged further prospecting.

THE BED 30 FEET BELOW THE BIG VEIN.

Where exposed 30 feet below tunnel No. 5, this seam was represented by a bed of carbonaceous shale 6 feet thick.

At station 20 (3) and at station 20 (4) the bed measured nearly 8 feet of shale and coal with strike S. 10° W. and with a dip 35° to the northwest.

At station 19 this bed of coal was reduced to a thin streak of coal measuring 1 foot 6 inches in thickness.

Where exposed below tunnel No. 4 this bed showed 16 feet 6 inches of very clean coal, but prospecting proved that this bed thinned entirely out by the coming together of the footwalls and the hanging walls within 20 feet of the tunnel that was started as Navy expedition tunnel No 3½.

Obviously, prospecting showed that this particular bed had no value in this location because of the lenticular character of the deposit.

BED EXPOSED AT STATION 24 A (B) AND (C).

The bed exposed at this location measured 7 feet 6 inches of clean coal of excellent chemical quality. The bed appeared to be soft, and the likelihood of obtaining lump coal was doubtful; but the bed appeared to represent the general characteristics of the coal in this field, and prospecting was begun to locate the horizon of this bed at a point nearer Trout Creek.

This bed was opened at the location marked on the map No. 2 as tunnel No. 3. A tunnel was driven in on this bed a distance of 77 feet, and the following variations in the strata were noted at the entrance:

Distance from tunnel mouth.	Strike.	Dip.
At mouth.....	S. 62° W.....	78° E.
4 feet.....	S. 60° W.....	70° E.
10 feet.....	S. 22° W.....	75° 30' E.
20 feet.....	S. 29° W.....	30° W.

The following sections were measured as the tunnel advanced (the timbers were spaced on 4-foot centers, and, as each set was placed in position, a section was measured across the bed to determine the thickness):

Tunnel Mine No. 3.

	Set No.—									
	7	8	9	10	11	12	13	14	15	16
Hanging wall.....	<i>Ft. in.</i> 1 7	<i>Ft. in.</i> 5 0	<i>Ft. in.</i> 5 0	<i>Ft. in.</i> 3 6	<i>Ft. in.</i> 4 8	<i>Ft. in.</i> 4 8	<i>Ft. in.</i> 5 0	<i>Ft. in.</i> 8 6	<i>Ft. in.</i> 4 6	<i>Ft. in.</i> 0 6
Coal.....	5 6	1 0	2 2	3 3	3 6	3 6	3 10	.....	.....	0 1
Footwall.....	1 6	3 0	2 0	2 0	.....	.....	.....	.....	4 0	8 2

On November 7 work was stopped on tunnel No. 3 because of lack of coal at the face. One hundred and eighty-two sacks had been loaded and delivered to the trail in case tests should be desired on this coal.

Extraction of the large sample of 855 tons of coal was made from the following openings:

Tunnel No. 4 (station 30, p. 6).—The major part of the sample (674 tons) was taken from this opening because, after it had been opened by the Navy expedition, it appeared to represent the best average conditions in the Bering River field. The bed varied in thickness from 16 feet 6 inches to 29 feet 2 inches and had an average dip of 35° to the northwest. Gangways, chutes or breasts, and crosscuts were driven in this mine, so that it was possible to observe the behavior of the coal under actual mining conditions. The necessity for heavy timberings, the presence of marsh gas in large quantities, the admixture of shale, igneous rock, etc., within the bed, the soft character of the shale roof, the large amount of water present in underground developments, and the small proportion of lump coal produced, were carefully noted.

The coal mined in tunnel No. 4 was loaded at the face into burlap sacks, each containing 220 pounds of coal. The sacks were tied and placed on a flat car which held 11 sacks. This tramcar was pushed by hand along a tramroad to the head of the No. 4 chute. The 11 sacks were then transferred to a sled, which operated down the chute and over the bridge, and lowered the coal 105 feet in elevation. The sled was controlled in descent and also brought up the hill by a rope and windlass at the head of the chute. This windlass was built of wood, was controlled by a wooden brake, and was handled with a 1½-inch rope.

Tunnel No. 5 (station 9, p. 5).—Because of the excellent quality of the coal in this opening and in order to do some prospecting in the tunnel to determine the cause of the unusual hardness and the physical properties of the coal, 154 tons of coal were sacked and delivered to the Trout Creek trail.

Tunnel No. 3 (p. 9).—Early prospecting by the expedition indicated that the bed opened in this tunnel represented the thinner coals of the field and contained excellent fuel. Underground development proved disappointing, however, as has been described above. Arrangements had been made to handle this output by building a short tramroad and chute, so that the coal loaded in this tunnel might be delivered to the Trout Creek trail. As the bed pinched entirely out, only 20 tons of coal were placed along the trail.

Tunnel No. 3½ (p. 9).—Where opened below tunnel No. 4, the bed under the "Big Vein" measured 16 feet 6 inches and contained clean, hard coal. It was expected that this bed would produce an excellent fuel, and development work was begun. Only about 7 tons were sacked before the foot and hanging walls came together and pinched the coal entirely out.

The following table shows the locations, the number of sacks, and the tonnages of coal taken for the Navy test:

Location.	Sacks.	Tons of coal.
Opening No. 4.....	5,982	674
Opening No. 5.....	1,400	154
Opening No. 3.....	182	20
Opening No. 24.....	65	7
Total.....	7,629	855

During the field examination, the following conditions affected the work of the expedition:

1. LOSS OF BARGE, PROVISIONS, AND EQUIPMENT.

On the morning of September 6, 1912, in Katalla Roadstead, Alaska, a 100-ton barge was loaded from the steamship *Mariposa* with personal baggage valued at \$1,320, and supplies and equipment valued at about \$9,000, which had been purchased for this expedition. About 11 o'clock, the 25-horsepower gasoline launch *Pioneer* took this barge in tow in order to effect a landing. Because of a severe storm which had been raging since the previous afternoon, the launch was unable to handle the barge which broke loose and was blown out to sea. The barge was not recovered. As a result of this loss, the expedition began work under serious handicaps.

2. TRAIL BUILDING.

The encampment on Trout Creek is $4\frac{1}{2}$ miles from the "cache" at the canoe landing on Stillwater Creek. During the Cunningham activities a narrow pack trail was built to connect these two points. Because of the rainy weather conditions in September, 1912, and because of the character of the soil and tundra over which this trail passed, the condition of this trail was so soft that a very large amount of work had to be accomplished before the pack train could make daily trips. The work consisted of (a) widening the trail so that a sled or go-devil or lizard could be used; (b) straightening the trail so that the rails and lumber could be hauled on the sleds; (c) building corduroy bridges at the most swampy places; and (d) throwing in brush, spruce boughs, rock, etc., at other soft places to give a foundation to prevent the miring of the horses.

The so-called "cache" was a wreck at the time of our arrival, and as the prospectors and miners filled the Trout Creek cabin, the gang working on the trail had to return to Stillwater cabin for housing each evening. The weather prevented caring for the men by pitching tents along the trail. As a result, the trail builders had to walk over marshy land an average of 3 miles before starting and after quitting work each day.

It was necessary to build the trail not only in order that 100 tons of provisions and supplies might be taken from the "cache" to the Trout Creek cabin, but also that the 355 tons of coal might be sledged during the winter from the mines to the canoe landing near the "cache."

3. CAMP CONSTRUCTION.

About 1903, during the early coal activities, a log cabin was built on Trout Creek. The ground floor of this cabin was used by the members of the expedition as a cook house, and the attic furnished sleeping quarters for 12 men. A large sleeping tent, 18 by 30 feet with accommodations for 28 men, a commodious wash tent, 16 by 24 feet, and three residence tents, each 12 by 14 feet, were built by the expedition.

In building this encampment, the following conditions affecting the health and safety of the men were considered.

(a) *Heavy winds.*—All trees within 200 feet of the camp were felled; the tents were fitted over a strong framework of rough lumber.

(b) *Heavy snows.*—In addition to having the tents fitted over the strong framework of rough lumber, the location was chosen with regard to safety from snow slides.

(c) *Heavy rains.*—The tents were built on raised platforms and were surrounded by ditches which emptied into the covered drains from the wash tent. This drain emptied in the creek below the cabin.

(d) *Water supply.*—The water supply was obtained from a creek along which there was no travel of men and which entered Trout Creek 180 feet above the camp. This water was delivered through a 1½-inch pipe to the wash tent and to the cook house.

(e) *Sanitation.*—The toilet facilities were located at a lower level than the camp and at a place where the wash would enter the creek below the camp.

There were unavoidable delays and difficulties encountered in building this camp, as follows:

(a) Delay in choosing location, due to the fact that the work of prospecting had first to be prosecuted to such an extent as would indicate the place where the large sample of coal was to be mined.

(b) Delay caused by lack of tools, as all the carpenter's tools were lost on the barge, September 6, and second-hand equipment had to be purchased from the several camps in the vicinity.

(c) Delay caused by lack of materials, as most of the lumber was lost during the floods of September 12, 21, and 27.

(d) Delay due to inability to transport floor lumber until the near completion of the trail.

(e) Delay due to inability to work many men on the camp until some of the tents were completed.

(f) Difficulty in constructing a camp by the use of an inadequate supply of very old second-hand tools.

(g) Difficulty in having to frame each tent with rough lumber, which was hard to obtain.

(h) Difficulty in having to perform the camp construction during a continuous downpour of rain.

The camp when completed was very comfortable and was appreciated by the men. The sleeping tent was equipped with 28 bunks built of canvas and poles cut in the woods and was heated by two Sibley stoves. The wash tent contained running cold water and a wooden tank of 350-gallon capacity for warm water, which was heated by means of a coil in a homemade coal stove. The blacksmith built this stove from a 50-gallon gasoline tank. The floor of the tent sloped toward the center and all waste water was delivered into a covered ditch which drained into the creek.

4. THE OPERATION OF PACK TRAINS.

In order to perform the transportation of material and supplies from the head of navigation to the location of the permanent camp, it was considered necessary, before the expedition entered the field, to procure 10 horses. Three of these were to have been purchased at Katalla and seven at Seattle. One of the Katalla horses was considered unfit for this service and was not purchased, and one of the others was killed on the trail August 29. Of the seven Seattle horses, one was drowned September 13, one was totally disabled September 22, one developed poll-evil from a wound received September 4 on the steamship *Mariposa*, and one was rendered only 50 per cent efficient because of a cold caught on the trip on the *Mariposa*. This brought the number of horses continuously available for our work down to the average of five.

The work accomplished by this pack train was the transportation of all food supplies, tools, and mine equipment from the "cache" on Stillwater River to the mines and camp on Trout Creek. The length of haul was $4\frac{1}{2}$ miles. One of the most important items was the transportation of 8,000 empty coal sacks, which required the use of the entire pack train for one month.

The operation of the pack train was made difficult by the following conditions:

- (a) The trail was very soft and heavy, due to the continuous rain.
- (b) A number of horses were unfit for continuous service, owing to injuries received prior to the beginning of packing.
- (c) Many articles, such as the coal sacks, were made heavy because they had become wet, due to the rain and the lack of tarpaulins.
- (d) It was impossible, except on a few occasions, to make more than one round trip per day.

It had been planned to transport coal from the mine to the canoe landing on the return trips of the pack train. This, however, was deemed inadvisable, because of the condition of the horses and of the heavy trail. At best, only 10 to 12 tons of coal could have been packed during the field work of the expedition if each horse had carried 100 pounds per trip, and this small amount, when compared with the 855 tons mined, did not seem to warrant the time of the men and the danger of overworking the horses.

5. CONSTRUCTION OF THE SURFACE PLANT.

The surface plant consisted of the following, and was constructed under the same difficult weather conditions as have been described above:

- (a) Blacksmith shop, constructed of a 12 by 14 foot tent and containing a homemade forge, bellows, and anvil obtained from the Cunningham cabin on Clear Creek, and tools, most of which were made by the smith.
- (b) Powder house for storing explosives.
- (c) Tramroad and chute for opening No. 3.
- (d) Tramroad (150 feet long), chute, and bridge (144 feet long) for opening No. 4.
- (e) Trackage and storage room for sacks from opening No. 5.

MINING CONDITIONS.

The following statements of the conditions affecting the mining of coal in a portion of the Bering River field are based on the preliminary investigation and the field examination by the United States Navy Alaskan coal investigating expedition during the fall of 1912.

The topography and geology of this field are presented in detail by C. A. Fisher of this expedition in an accompanying report.

The transportation and markets are discussed in the Report of the Alaska Railroad Commission, 1913.

Gangways, chutes or breasts, and crosscuts were driven in the openings by this expedition, so that it was possible to observe the behavior of the coal under actual mining conditions. The necessity for heavy timbering, the presence of marsh gas in large quantities, the admixture of shale, igneous rock, etc., within the beds, the soft character of the shale roof, the large amount of water present in underground developments, and the small proportion of lump coal produced were carefully noted and the information used in forming estimates of the cost of producing coal in this field.

1. THE QUALITY OF THE COAL.

(a) *Chemical analysis.*—On chemical analysis some of the Bering River coals are shown to be of excellent quality. When care is used in excluding all shale and intrusive material from the sample these coals show low ash, low moisture, 10 to 25 per cent volatile matter, and high calorific value.

(b) *Physical properties.*—The coals in this field are prevailingly soft. This physical condition is probably due to the crushing and shearing strains induced by the geologic disturbances. Exceptional locations, however, have been found where the coal is sufficiently hard to yield a fair percentage of lump; but seemingly this hardness occurs only in the immediate vicinity of faults where the break in the strata has relieved the crushing pressure and permitted the coal to maintain its original hardness.

In mining operations, judging from conditions thus far found, the loss of coal will be high. It is doubtful whether, under present mining methods, a recovery of over 25 per cent will be possible from a number of the most favorable beds. It is believed that the coal of some beds will be found so soft and crushed that the coal will "flow" or "run" under pressure induced by the mining operations, so that it would be difficult to maintain pillars. It is possible that some modification of existing methods of mine packing could be applied that would insure a high percentage of recovery; but such a method would necessitate the quarrying of rock or the excavation of gravels on the surface and delivery into the mine of the packing material and would render the cost of mining high.

2. IRREGULARITIES OF THE STRATA.

Much information was obtained concerning the irregularities of the strata. In certain localities in this field the strata are so broken that it may be necessary to follow the practice of the metal miner and block out the vein in order to develop the coal sufficiently to main-

tain the output. This may call for the driving of tunnels and upraises through rock without the production of coal. The effect of these geologic disturbances on the mining conditions will be to increase to an important item the cost of "dead work."

3. CHARACTER OF FOOTWALLS AND OF HANGING WALLS.

Each footwall in tunnels Nos. 2, 3, 4, and 5 is a firm sandstone with a dip of over 40°. The contact between the footwall and the coal is a smooth surface from which the coal parts easily. The hanging walls are invariably shale which is soft, slippery, and clodlike. There is no well-defined line separating the shale hanging wall from the coal, but instead the transition from coal to shale is gradual. A roof of this character is difficult to hold, especially in a country of broken strata; and the water seepage is great.

4. METHANE (CH₄).

The amount of methane or marsh gas exuding from the coal is large. In both tunnels No. 4 and No. 5 this gas was found in large quantities in gangways and chutes beginning at a distance of 80 feet from the tunnel opening. The occurrence of this gas, combined with other information concerning mining conditions, indicates that the coals in this part of the Bering River field will yield under development an amount of methane that will be difficult to handle, especially below water level where safety lamps will be required.¹

5. MINE WATER; COAL DUST.

Evidence tends to show that the mining of the thick beds will produce much dust and that water will be encountered. The coal in tunnels No. 4 and No. 5 was 16 to 30 feet thick, and where entries and chutes had been driven in the footwall the face was always dry and dusty.² In the crosscuts, however, which were driven horizontally to prove the seam, much water was encountered as soon as the hanging wall was reached. It is reasonable, therefore, to predict that for this field of heavy rainfall a heavy pumping charge, below water level, must be added to the cost of mining.

6. MINE PLANS.

The dip of the beds upon which work was done averaged 40°, and the method of mining usually adopted in similar conditions is known as the "pillar-and-breast" method with water-level gangways driven approximately with the strike of the bed and breasts driven directly up the pitch or at about right angles to the gangways. The Navy expedition found under this method that in tunnel No. 4, 5 to 7 feet was the maximum width that could safely be used for the breasts. The gangways were driven with a 5-foot collar, the total width of coal extraction being 7 feet.

¹ Methane, or marsh gas (CH₄), when mixed with air between the proportions of 1 to 20 and 1 to 7, explodes when ignited.

² Dry coal dust when brought into suspension in the mine air is often explosive and may be ignited by a blown-out shot, an electric arc, or an open flame.

It may be practicable in this field to use the longwall method of mining supplemented by a suitable system of hydraulic packing that would fill the workings with sand or gravel as fast as the coal is removed. This method would result in a larger extraction per foot-acre and a lower mining cost.

7. MINE TIMBER.

The hills and ridges up to the timber line (1,800 feet in elevation) are covered with a dense growth of spruce and hemlock. These trees are usually tall, straight, and knotty. Many trees are killed each year by porcupines, which gnaw the bark in a complete circle around the base of the trunks. Because of the shortness of the summer, the Alaskan trees are rather brittle, and the heavy winds cause many windfalls.

There is not sufficient timber on the surface of most claims to meet the needs of operation of the coal mines that would be necessary to develop fully those claims. It is estimated that from one-third to one-half of the mine timber will have to be imported in case mining activities are established.

The method of timbering adopted by the Navy expedition to make mining safe is known as "fore-poled or fore-lagged timber sets." In the "pillar-and-breast" method of mining, "breast boards" will be necessary in the driving of many chutes and breasts to prevent the running of the coal which would contain large amounts of the soft roof material.

The amount of timber that will be required per ton of coal produced will be large. The actual amount of timber used by the Navy expedition in the "pillar-and-breast" method of mining was 38.6 feet b. m. per ton of coal. This figure may be reduced, possibly to 25 feet b. m., in case a successful modification of the longwall method of mining can be applied. If the Government should operate these mines, the cost of timber in place in the mine should not exceed \$20 per 1,000 feet b. m.; for a private company that had to purchase the timber the cost would probably reach \$30 per 1,000. These figures include all timber items, both labor and supplies.

8. MINE HAULAGE.

The haulage problem may be attacked in either of two ways:

(a) Each bed may be treated as a separate development. Under this system the average amount of tonnage that will pass over a yard of constructed haulageway will be small and the cost per ton high.

(b) Long development tunnels may be driven through rock across the pitch of the bed. Under this method the average amount of coal passing over a yard of constructed haulageway will be large, but installation and maintenance costs of the long haulageways will be high, and the cost per ton also a large item.

It is estimated that the haulage cost for a large tonnage will approximate 10 cents per ton.

9. COAL WASHING.

It is believed that the coals of this field, if opened on a commercial scale, will require washing because of (a) the foreign material within the beds, such as shale, sand accretions, and igneous intrusions;

(b) the prevailing soft nature of the coal, with little or no lump; and
 (c) the probability of the admixture of roof material, owing to the generally soft and slippery nature of the shale hanging walls. All of the bituminous coals in the Rainer field, Wash., are washed because of the existence there of conditions similar to those just described.

10. BRIQUETTING THE COAL.

If the coals from this field are found, from actual firing tests on naval vessels, to contain too small a percentage of lump coal to render their use successful as fuel for United States ships, it is quite possible to briquet this coal, and produce thereby a fuel suitable for the needs of the Navy and for domestic purposes. This method of treatment is applied to a considerable extent to the soft Cardiff coals for the use of the British Navy at Victoria. In case the Bering River coals be so treated, the binder would probably be obtained from the asphaltic oil district of southern California; and it would be advisable to have the briquetting plant near the docks and equipped with suitable arrangements for handling raw coal and for storing briquets.

11. LABOR COSTS AND EFFICIENCIES.

At present the cost of labor in this field is high; emergency work is valued at \$1 per hour, and steady employment at \$5 per day, including subsistence. Furthermore, labor is rendered less efficient because of weather conditions.

The present high cost of labor may be partly overcome by the establishment of a permanent industry in this field; but the climatic conditions will continue to handicap all outdoor work, and the interest charges due to the high development cost must be borne as an operating expense for a considerable number of years.

SUMMARY OF MINING COSTS.

It is assumed in the following tabulation of the above estimates—

1. That the Government will own and operate coal mines and timber claims and that royalties and amortization of capital are not required.

2. That it will be possible successfully to apply the long-wall method of mining combined with some form of hydraulic packing that will reduce the amount of timber per ton 25 per cent over that required by the pillar-and-breast method.

3. That for mines owned or leased by private capital the following items must be considered:

	Cost per ton.
Timber supplies.....	\$0. 25
Royalty.....	.10
Depreciation of plant.....	.10
Total.....	.45

4. That these figures are subject to variation, depending on the tonnage and on further field examination.

	Cost per ton.
Mining and loading at face.....	\$9.75
Timbering—all labor items.....	.50
Advance work—rock tunnels, etc.....	.50
Care of mine—cleaning falls, stoppings, ventilation, lighting, etc.....	.30
Haulage—underground and hoisting.....	.15
Pumping and sprinkling.....	.05
Power—steam or water power.....	.10
Outside plant—tramming, dumping, screening, cleaning, picking, etc.....	.15
Superintendence, engineering, bookkeeping, etc.....	.10
Total cost f. o. b. cars or washery.....	2.60

CONCLUSION.

In a consideration of the present value of the Bering River field as a source of fuel supply for United States ships the enormous quantity of coal deposited and the excellent chemical quality of the fuel is generally admitted. The occurrence of these deposits, however, is everywhere lenticular and irregular, and no location has been found where any bed maintains uniform conditions of thickness and characteristics for any considerable distance. In a measure, the chemical purity is offset by the friable physical quality of the coal, which may make it impossible to produce from the mines any considerable proportion of lump coal; and the fact that strata within which the beds of coal occur are disturbed to such an extent will make the cost of mining high.

GEOLOGY OF THE BERING RIVER FIELD AND ITS RELATIONS TO COAL MINING CONDITIONS.

By C. A. FISHER and W. R. CALVERT, mining geologists.

TOPOGRAPHY.

(Map No. 1).

The Bering River coal field as a whole presents two distinct types of topographic development. It contains irregular rugged hills of moderate elevation and about an equal areal proportion of featureless lowlands traversed by numerous small streams or occupied by arms of glaciers or by glacial lakes of considerable size. The transition from hills to lowlands is abrupt and clearly outlines the two topographic Provinces. The maximum relief in the coal field proper is about 3,000 feet, but most of the ridges rise to about 2,000 feet above sea level. On the northwest and southeast the field is bordered by glaciers, on the northwest by Martin River Glacier, and on the southeast by Bering River Glacier, both of which are derived from the Chugach Mountains to the north. Broadly viewed, the Bering River coal field constitutes a part of the foothill zone between the Chugach Mountains and the coast.

The hilly parts of the field are characterized by moderately high, steep-side, narrow-topped, irregular ridges, separated by deep canyon-like valleys. The prevailing trend of the more prominent ridges, such as Carbon, Canyon Creek, Cunningham, Kushtaka, and the ridge to the west of Shepherd Creek is northeast or roughly parallel to the tributary drainage. In general the eastern slopes of these ridges are steep, whereas the western slopes are less precipitous. Most of the hills or ridges are gashed by numerous small canyons on their lower slopes, higher up are rounded peaks or shelving areas, and then come bare cliffs eroded at the top into sharp irregular peaks and ridges. It is in the deeply eroded canyons and in the faces of the bare cliffs that the best exposures of coal are found.

The lowlands are traversed with a network of rivulets which empty into small swamps or the larger lakes. The lowland is only a few feet above sea level, and it is characterized by featureless grass-covered flats which merge seaward through a zone of swamps into shallow lakes or the tidal flats surrounding the bay.

The trunk drainage course of the field is the Bering River, which flows in a general southwest direction from First Berg Lake to the coast, a distance of about 20 miles. Its principal tributaries from the

north, and the ones that drain the Bering River field proper, are Canyon, Stillwater, and Shepherd Creeks. Canyon Creek has its principal source in Martin River Glacier but receives a number of small tributaries from either side throughout its course across the east part of the field. In the upper part of its course this stream follows a narrow canyon, which, to the southward near the confluence of the creek with Bering River, opens on a wide flat. Stillwater Creek, the outlet of Kushtaka Lake, is a short stream but carries a large flow of water. Kushtaka Lake is fed from an arm of the Martin River Glacier. The creek receives two tributaries from the north, Clear and Trout Creeks, which drain either side of the Cunningham Ridge. On both of these creeks, but mainly on Trout Creek, much development work has been done on the coal beds. Shepherd Creek crosses the western portion of the field, connecting Lake Charlotte with Bering Lake. It receives a number of tributaries, of which Carbon Creek from the east is the largest. It is on this stream that many of the English company's coal openings have been made. Most of the tributary streams that drain the coal field proper have relatively low gradients to near their head, where the gradients become steep. This topographic feature not only offers easy access for railroad lines, but places above water level a large aggregate tonnage of coal in the adjoining ridges. The largest tributaries from the east which enter Bering River are the Gandil and Nichawak Rivers, both of which are outside the coal field proper and therefore unimportant in the present consideration.

The region presents at least three types of vegetation which bear a close relationship to the topography. The field, as a whole, is only partly forest clad. The lower slopes of the hills and some of the sandy flats support a dense growth of evergreens, mainly spruce and hemlock, the spruce usually attaining a large size. Above timber line, which is about 1,500 feet, the surface is bare in places, but is largely covered with grass, devil's club, small bushes, and a stunted growth of spruce and alder. On the lowlands the vegetation consists mainly of grass and bushes, but deciduous trees, mainly cottonwoods and alders, grow along the watercourses.

LAKES.

The larger lakes of the field comprise Bering, a shallow tidal lake or lagoon in the southwestern part; Kushtaka, a deep glacial lake near the middle; and First Berg, also a deep glacial lake in the northeastern part of the field. In addition to these, there are three smaller glacial lakes, known as Charlotte, Tokun, and Deadwood, in the northwestern part of the field.

GLACIERS.

As previously stated, the Bering River coal field lies between the Martin River Glacier on the north and the Bering River Glacier on the south. An arm of the former, known as Kushtaka Glacier, extends into the field from the north nearly to Kushtaka Lake, occupying an area of about 5 square miles, and in the extreme northeastern part of the field there is a slope glacier on Carbon Mountain covering an area of about 4 square miles.

TRANSPORTATION.

The natural route of transportation from Controller Bay to the Bering River coal fields is up the wide glacial flats along Bering River, especially above the union of Bering River with Bering Lake. Below this point two alternative routes present themselves—one down Bering River proper and another across Bering Lake, over a low divide, and thence down Katalla River to the vicinity of Katalla. Water transportation by way of Bering River and its principal tributaries, or by Bering Lake, is practically the only way at present of reaching the coal field from Controller Bay, and it is along the wide glacial flats bordering this stream that most of the preliminary surveys of the various railroad companies have been made, as is shown by the transportation map accompanying this report.

Six different railroad companies have surveys extending from Controller Bay to different parts of the coal field. These companies are known as the Alaska-Pacific Railway & Terminal Co.; Copper River & Northwestern Railway; Controller Railway & Navigation Co.; Controller Bay & Bering Coal Railway; Bering River Railroad; Kush-ta-ka Southern Railway. Two of these companies, the Controller Railway & Navigation Co. and the Controller Bay & Bering Coal Railway, have made two distinct surveys, an old and a new. The course of these different surveys, their terminal points, and the different parts of the field that they enter are shown on the map accompanying Senate Document No. 12, Sixty-second Congress, first session (Apr. 26, 1911).

The route up the valley of Bering River from Controller River to the coal fields presents no special difficulties in railroad construction, other than that the lower part is through tidal flats and much of the remainder is over low, swampy marshes crossed by numerous glacial streams, which would necessitate a large amount of bridge work that would be subject to damage from the not infrequent and often severe floods. The crossing of Bering River above Bering Lake and the crossing of Bering Lake on pile bridges would be portions of the construction that would be relatively expensive. Shepherd, Stillwater, and Canyon Creeks have eroded deep valleys far back into the interior of the coal field, and these valleys enable railroad lines to enter without serious difficulty nearly all parts of the field.

It is difficult to estimate the cost of railroad construction in a region of this character, so remote from a base of supplies and having so many unusual and untried physical conditions. Judging from what railroad building has been done in this general region, the cost would be more than double the cost per mile through a country of similar character in the States. In addition to the high first cost of a railroad in this district, there must be allowance for heavy maintenance charges, as has been found by experience in operating railroads in southeastern Alaska.

As to the cost of constructing a harbor suitable for handling the production of this coal field, experience has shown that a very large expenditure of money would be required and that the final results would be uncertain.

GEOLOGY.

(Map No. 1.)

STRATIGRAPHY.

The rocks that outcrop in the Bering River coal field are of two general classes: (1) Loose, unconsolidated sediments of recent deposition, which, for the most part, occupy the lowlands; and (2) the indurated and highly folded shales, sandstones, and coarse arkose found on the hills. The indurated rocks are intruded to some extent, especially in the Carbon Mountains district, by igneous rock, mainly diabase and basalt in the form of dikes and sills. The total thickness of the sediments in the Controller Bay region probably exceeds 12,500 feet. They comprise graywackes, shales, etc., of pre-Tertiary age, and the Katalla, Stillwater, Kushtaka, and Tokum formations, of Tertiary age. The four last-named formations outcrop in the Bering River coal field proper, but probably only the Kushtaka is coal-bearing, and is therefore the only one of immediate concern in the present investigation. The age, formation, character, thickness, and general succession of the rocks are shown in the following table:

General section of rocks of the Controller Bay region.

Age.	Formation name.	Character of rocks.	Thickness.
Quaternary.....		Stream deposits, probably in part underlain with marine sediments.	<i>Feet.</i> 0-500±
		Sediments and abandoned beaches of glacial lakes.....	0-200±
		Morainal deposits.....	0-100±
		Marine silt and clay.....	100
Tertiary or later.....		Diabase and basalt dikes.....	
Tertiary.....	Tokum.....	Sandstone.....	500
		Shale.....	2,000±
	Kushtaka...	Arkose with many coal beds.....	2,500±
	Stillwater...	Shale and sandstone.....	1,000±
	Katalla ¹	Conglomerates and sandstones and shales, some of which are conglomeratic.	2,500
		Sandstone.....	300
		Shale concretionary and with a glauconitic bed at the base.	2,000
		Sandstone.....	1,000±
		Shale.....	500+
Pre-Tertiary.....		Graywackes, slates, and igneous rocks.....	

¹ The position of the Katalla formation with reference to the other Tertiary formations is not definitely established.

The Kushtaka, which is the principal coal-bearing formation of the field, consists of alternating beds of shale and of coarse arkose or sandstone. The rocks are indurated throughout. Above the middle of the formation there is a heavy bed of coarse arkose, which causes waterfalls wherever streams cross its outcrop, and, owing to its hardness, has resisted erosion sufficiently to cause shelving on the hillsides. The entire formation has a thickness of 2,500 feet, and overlies, in presumable conformity, the Stillwater formation, which is believed not to be coal bearing. Normally the Kushtaka formation is overlain by the Tokum formation, which is also not coal bearing, but on Shepherd Creek overthrust faulting has brought the Tokum in contact with the Stillwater formation.

The distribution of the Kushtaka formation is shown on the geologic map (No. 1) accompanying this report. It will be seen by reference to the map that the formation occupies much of the northern part of the land area lying between the Bering River and Martin River Glaciers.

The areal extent of recent unconsolidated sediments within the area occupied by the Kushtaka, or coal-bearing, formation is comparatively small.

STRUCTURE.

Viewed broadly from some commanding point in the Bering River field—from Kushtaka or Cunningham Ridge, for example—the structure appears to be fairly uniform, for the persistent sandstone member forming the falls on the various western affluents of Clear Creek can be noted along an extent of several miles without marked change in direction of trend. This appearance of uniformity is very illusive, however, for a closer study of the field demonstrates that the area has been subjected to intense dynamic stresses, and that almost every portion gives evidence of those stresses in the form of folds, faults, and rock crushing. In places the strain resulted in folds—here open, there sharply bent. In other places the strata broke instead of bending, and sharply defined faults resulted. A more frequently noted evidence of rock stress, however, is slickensiding of the harder strata or crushing along bedding planes in the softer zones, owing to constantly recurring slippage along lines of least resistance. Crushing is most common in the coal beds, the result being ordinarily either a finely crushed, almost incoherent mass or flakes having the appearance of molybdenite. Flat-lying beds are rare; instead, steep dips prevail. Overturned strata are not uncommon. In fact, the more closely the field is studied the more one appreciates what tremendous forces have been at work to deform from their original recumbent attitude the formations involved.

From the foregoing general statements it will be gathered that the writer views the Bering River coal field as an area of great structural complexity, and no one knowing the significance of geological evidence can arrive at any other conclusion. The complete history of the deformation, however, can not be given here, for the lack of any readily recognized rock stratum and the prevailing absence of natural exposures combine to render a complete interpretation of structural forms a tedious if not impossible task. Moreover, regional study is quite as necessary as local observation in deciphering the history in its completeness, and for such study time was not available, nor was it considered pertinent to the particular problem involved in the investigation. Martin in his publication on the field gives an excellent discussion of the structure, though even his extended investigation was not sufficient for unraveling entirely the tangled evidence obtained. According to Martin—who in this view is entirely in accord with that of the writer—the theory best accounting for the structural conditions as known is based on the following suppositions:

(1) That there was, in late Tertiary time, a zone of intense deformation in the present position of the Chugach Mountains, but that this deformation did not extend into the coastal part of the region here described.

(2) That the rocks now outcropping on the shore of Controller Bay were then well to the north of their present position and were involved in these intense movements.

(3) That, as a final stage in their deformation, the Tertiary rocks rode southward in one or more great overthrusts and came to rest on Mesozoic strata, which were at a distance from the zone of intense deformation and hence were not affected by it.

It does not seem essential, however, in this report to state the various lines of evidence upon which Martin bases his theory, as results rather than causes of deformation are of prime importance in the present consideration of the economic aspect of the Bering River field. The general structure of the area involved is a steeply dipping rock succession, the prevailing direction of the dip being to the northwest. Locally, this direction may be altered markedly by faults or transverse folds. Four large faults are known to traverse the coal field, as shown on the accompanying map (No. 1.) Kushtaka Ridge is cut by two of these, one near the southern end and another along the western slope. The other two faults outline a narrow block east and south of Charlotte Lake. There are several other displacements of considerable magnitude in the mountainous district near the coast, but these have no special bearing on the economic value of the field. Throughout the entire area, however, faults of lesser dimensions are exceedingly numerous, some representing a stratigraphic displacement of several hundred feet.

Every tunnel of any consequence encounters one or more of these lesser breaks. In the northeastern part of the field the Davis mine has struck at least six of these faults in 500 feet of entry. The McDonald mine at the opposite end of the field near Bering Lake discloses similar conditions, and the prospect tunnels in the intervening area encountered the same difficulty. Such faults are particularly objectionable in the Bering River field, for in addition to presenting the customary trouble in driving they act as underground channels for the excessive amount of water that permeates every part of the rock section.

Dozens of faults of sufficient magnitude to be noted without special search were observed in the general surface examination of the field, but their very number prevented detailed recording. Just below the falls on the middle fork of Barrett Creek a strike fault was noted that must be of considerable displacement, as it appears to cut practically the entire middle group of coals. A less apparent fault, but one that was demonstrated beyond question in the course of prospecting, trends up the valley of Trout Creek near the center of the Tenino claim of the Cunningham group. The presence of this fault was not suspected till attempt was made to find the eastward extension of the coals exposed along the west bank of the creek. The continuation of the hard 30-foot bed was made an especial object for search, but it certainly is not to be found at its supposed location as indicated by the strike shown at the tunnel. Moreover, at certain localities on the east bank, where trail making has exposed the rocks to view, the dip is changed from its expected high angle, becoming almost flat. In all the prospecting done previous to the present investigation and in the later detailed search made under the supervision of Mr. Calvert it is significant that not one of the larger beds opened on the west side of the valley has been found on the east bank.

The middle course of Bear Creek near point 64, map No. 1, shows along its canyon walls much structural disturbance, usually in the form of faults. In fact, it may be stated that every part of the field,

except possibly the ridge lying between Trout Creek and Kushtaka Glacier, is traversed by an intricate system of fault lines, making underground development everywhere tedious and costly and in many places almost, if not quite, impracticable, except where the extraction of only a limited amount of coal is contemplated.

Folds are frequently associated with the structure of the Bering River field. They appear to increase in number progressively north-eastward, the Carbon Mountain anthracite district being especially involved in this type of structure. In this northeastern part of the area the folds are much compressed and some are overturned in addition, but to the southwest some of the folds become more open. The majority of the folds are along or only slightly divergent from the normal northeast strike, though there are several notable exceptions to this general rule. Carbon Creek in the western part of the field is cut along the axis of such an abnormal anticline.

In view of the many folds exposed here and there by the erosive action of streams, it is reasonable to assume that many others are present, for the reason that as the stream cutting is purely accidental it would be unlikely to uncover only those areas where folds exist. Because of the large number of folds known to be present in the field, it is not always safe to assume, in passing over a seemingly normal rock succession, that conditions are as they seem, for localities have been noted where a single coal bed appears at the surface as three nearly parallel lines of outcrop. Such examples were observed in the Carbon Mountain district, at the head of Moores Creek, and on Carbon Creek.

The writer is firmly convinced that there is a close relationship between the structure of the Bering River field and the physical character of the coal. It has been stated previously that the coals below the anthracite class are prevailingly soft, and with a molybdenitic appearance. Occasionally, however, an exposure was noted where the coal is hard and lacks the usual crushed look. A careful study of this anomalous condition demonstrated that the physical hardness resulted from close association with folds or large faults. During the period of overthrust, when the entire rock mass moved seaward, there were successive shear movements along bedding planes, and where such movements were not checked the coal beds were crushed excessively. Locally, however, the rock section broke sharply, and became arched or depressed into folds, thus relieving from shearing action rocks adjacent to such fault planes or involved in the folds themselves.

Along major faults, therefore, or in compressed folds the coal, when present, though slickensided, is usually not foliated. The extensive folding in the Carbon Mountain district is believed to have been a prominent factor in the formation of the hard coal such as is known to exist there. The two beds of hard coal opened on the west bank of Trout Creek are now known to be adjacent to a large fault. On the east slope of Kushtaka Ridge a 6-foot bed of hard coal outcrops very near the major fault, trending from the south end of the ridge to the north end of Kushtaka Lake. On Queen Creek a bed of hard coal is exposed on either limb of a closely compressed fold. Again, at the head of the south fork of Barrett Creek a closely folded anticline involves a small coal bed, and there also the coal is hard. In fact, nowhere in the field does it appear that hardness of coal is

not immediately associated with abnormal structure. Hence, development on a hard bed is very likely either to encounter a fold or fault in one direction, or in the opposite direction to yield progressively softer coal as the distance from the abnormal structural condition increases.

THE COAL.

AREAL EXTENT.

As the Kushtaka is the principal coal-bearing formation of the Bering River field the surface extent of the important coals is restricted to the area of outcrop of that formation, which is shown on the map accompanying this report. Coal outcrops have been found in what is believed to be the upper part of the underlying Stillwater formation, but little information is available concerning the extent and character of these coals. It is believed that they are commercially unimportant. The total area underlain by coals of the different varieties in the Bering River field has been estimated by Martin to be 68.4 square miles, including the outcrop area of the Kushtaka and the area to the northwest to a depth of practical mining.

STRATIGRAPHIC POSITION.

The coals are distributed throughout the entire thickness of the Kushtaka, and possibly into the upper part of the underlying Stillwater formations. It is believed that more than 20 beds of locally workable coal occur within the Kushtaka, but owing to the prevailing complexity of structure that exists in this field it is possible that some of the beds believed to be distinct are in reality duplications. These beds arrange themselves into three rather indefinite groups—a lower, a middle, and an upper.

The evidence favoring the belief that these groups are distinct within themselves and not duplications caused by major strike faulting consists in the wide variation in stratigraphic interval between individual beds in the respective groups, especially when the lower is compared with the middle or the upper; also in the difference in the aggregate number of coal beds present in each group, even when these groups are examined at nearby places across the strike, as on Barrett Creek, and further in the absence of indications of disturbance of strata such as should be present if strike faulting sufficient to cause group duplication had taken place.

The lower group contains eight beds of coal which are moderately thick and generally 100 to 800 feet apart; the middle group has nine beds closely grouped within about 400 feet of strata, and the upper group contains five beds of variable dimensions and slightly more widely separated than those of the middle group.

THICKNESS AND CHARACTER.

The various beds of coal found in the field range in thickness from 6 to 10 feet. The thickness of the individual beds varies considerably. In some places there is an actual thinning of the entire bed, and at others impure coaly shale or horsebacks reduce the thickness of the pure coal.

In physical properties the coals of the Bering River field bear a strong regional resemblance to each other. They are prevailingly soft

and friable, with a pronounced foliated structure and graphitic luster. In at least 90 per cent of the beds the coal has been badly crushed and shearing planes are highly developed. A few beds appear to be moderately firm, but such beds are generally closely associated with faulting, where the pressure causing deformation has been released. The soft, friable condition of the coal is not a surface aspect due to weathering, as has generally been supposed, but is deep seated. In different parts of the field where development work has been carried on, the coals that are soft and friable at the surface do not increase perceptibly in hardness under ground.

According to analyses made from samples collected by Martin, Holmes, and Storrs, the coals of this field grade from semibituminous to semianthracite, but, as the change in these coals from one class to another is transitional, it is impossible to draw a sharp line of demarcation between them. In general, the west half of the field is underlain by semibituminous and the east half by semianthracite coal. Considering the entire district the coals range in amount of fixed carbon from 73 per cent to 87 per cent, in volatile matter from 7 to 18 per cent, have a low moisture content, and are low in ash. In calorific value they range upward from 14,000 B. t. u.

Following is a table of analyses showing various samples of Bering River coal that possess the proper chemical qualities for a desirable naval fuel:

Analysis of Bering River coals.

[Samples yielding from 12 per cent to 22 per cent volatile matter and more than 14,000 B. t. u.]

Sample No.	Laboratory No.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	B. t. u.	Reference.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>		
12	12715	1.60	11.90	84.70	1.80	0.95	15,020	Holmes.
4	12708	1.80	14.00	81.70	2.50	1.15	14,860	Do.
13	12717	1.80	13.70	79.90	4.60	1.20	14,400	Do.
10	12706	2.90	12.10	80.30	4.70	1.20	14,080	Do.
8	12712	2.10	13.50	78.20	6.20	.70	14,180	Do.
A		2.12	13.00	82.18	2.70	None.		Storrs.
B		2.72	12.34	80.44	4.50	.15		Do.
C		4.34	14.08	73.38	8.20	.50		Do.
D		3.10	13.24	81.26	2.40	.01		Do.
E		3.34	12.34	82.82	1.50	.40		Do.
F		1.62	14.37	77.21	6.80	.88		Do.
G		1.92	15.29	77.29	5.50	.20		Do.
H		2.65	13.93	74.12	9.30	None.		Do.
I		2.02	13.41	81.22	3.35	None.		Do.
J		2.17	12.45	81.58	5.80	None.		Do.
K		1.32	14.10	81.98	2.60	.28		Do.
L		1.70	13.07	79.93	5.30	None.		Do.
M		.76	13.76	81.03	4.45	Trace.		Do.
N		2.20	14.15	81.90	1.35	None.		Do.
O		1.34	14.14	75.02	9.50	Trace.		Do.
P		.80	13.50	80.89	4.75	Trace.		Do.
Q		1.38	13.52	82.55	2.55	None.		Do.
R		1.98	14.80	81.02	2.20	Trace.		Do.
S		1.64	12.66	83.00	2.80	.77		Do.
T		2.11	16.68	79.68	1.63	.78	15,574	{U.S.G.S. Bull. 335.
U		2.36	18.12	71.87	7.65	.78	14,074	Do.
V		5.43	13.12	79.65	1.80	.67	14,445	Do.
W		4.23	14.03	79.75	1.99	.96		Do.
X		.66	16.61	78.71	4.12	1.25		Do.
Y		5.60	13.65	76.81	3.88	.77	14,558	Do.
Z		1.20	17.28	77.69	3.83	.78		Do.
AA		4.94	13.34	77.29	4.43	.83		Do.
BB		4.01	12.46	77.47	6.06	1.11	14,171	Do.
CC		4.22	13.37	78.80	3.61	1.56	14,308	Do.
DD		.38	16.97	77.48	5.17	1.02		Do.
EE		5.95	13.01	76.12	4.92	.61		Do.
FF		2.41	15.03	79.24	3.32	.51	15,021	Do.
GG		6.03	12.98	78.40	2.59	.70	14,332	Do.
HH		5.14	13.90	75.96	5.00	1.16	14,065	Do.

ATTITUDE OF COAL BEDS.

Most of the coal beds dip steeply, the dips ranging from 46° to 50° to the northwest, with strike to the northeast. However, owing to the faulted and disturbed condition of the measures the dip and the strike of the coal beds deviate widely from the normal in many places. In certain localities the direction of the dip and the strike of the coal bed are directly reversed, and in other places several changes in the direction of dip and strike take place within a very limited area. The absence of adequate exposures in places of this kind made it practically impossible to determine the local structure so as to predict with any degree of certainty the position of the coal bed involved.

COMBUSTION.

The coals of the Bering River field being high grade burn with a short flame and emit little smoke. Throughout the western part of the field, or the coking-coal area, the coal fuses somewhat and cakes soon after ignition; consequently, it "bridges over" in the fire box and prevents compactness of the fuel mass, thus tending to smother combustion, a tendency that must be regarded as having a certain redeeming value in such a friable coal.

Previous workers in this field have subjected the semibituminous coals to improvised coking tests with results, in the main, satisfactory. The samples tested generally yielded a bright, silvery, finely porous coke, which was rather light but firm. It is probable that under proper treatment nearly all of the semibituminous coals of this field can be made to yield an average quality of coke.

DESCRIPTION BY DISTRICTS.

CLEAR CREEK DRAINAGE BASIN.

DETAILED DESCRIPTION.

On the date of our arrival in the field, August 24, an examination was made of the lower course of Clear Creek in the vicinity of Cunningham Cabin. On the following day, August 25, we followed up Clear Creek to near the mouth of Barrett Creek, where one thick coal bed, opening in two places and occurring in the so-called lower group of coals in this field, was examined. The bed was about 12 feet thick, and dipped at an angle of about 35° to the northwest. It was composed of bright looking coal, which was badly crushed and sheared, causing a molybdenitic structure. It contained about 5 per cent of hard, coaly, cannon-ball nodules, which were obviously very impure and which in burning would yield a large percentage of ash. We continued up Clear Creek to the mouth of Barrett Creek, where we followed the trail on the left side of the stream to a point above the falls, the coals showing in Barrett Creek having been previously examined by Fisher, who determined their character and thickness. After reaching a point above the falls on the east bluff of Barrett Creek, we descended into the Creek Valley and followed up a short, narrow, canyon tributary on which are exposed about 12 beds of coal 4 to 12 feet thick, in close stratigraphic proximity and constituting the so-called middle group of coals of this geologic section. These coals are bright and relatively clean, but, without exception, badly

crushed into a molybdenitic structure. Shaly bodies, commonly known as "horsebacks," are frequent in the thicker beds, and the entire series dips at an angle of about 45° to the northwest.

After reaching the head of this canyon, where the higher coal horizons are concealed by moss and tundra, we followed along the strike of the formation to the north fork of Barrett Creek, thence down that canyon tributary to Clear Creek, again passing through the middle group of coals at another point on the strike. Here the general series of coals seen on the south fork of Barrett Creek could be recognized; that is, a number of coal beds occurred in close proximity and at the same stratigraphic position with respect to the Kushtaka, so that the groups seen on the north fork of Barrett Creek could with certainty be correlated with those on the south fork but the individual beds are changed so much in character as to render their correlation doubtful.

The coals of the lower group exposed in the vicinity of the mouth of Barrett Creek are easily accessible, occurring at an elevation of 500 to 600 feet above sea level, whereas the middle group of coals, comprising many more beds, ranges from 1,200 to 1,600 feet above sea level, or 1,000 feet above Clear Creek, and is consequently much more inaccessible.

On August 26 an examination was made of the area drained by the headwaters of Clear Creek. About 200 feet west of the so-called Storrs Cabin, at the base of the falls on Clear Creek, the face of a bed of coal 12 feet thick had been cleaned; the bed had also been opened by a short tunnel lower on the dip. The coal in this bed is bright and clean, but contains the cannon-ball nodules mentioned above. The bed is crushed and sheared throughout. It occurs immediately beneath a bed of coarse arkose or sandstone, and because of its stratigraphic position near the top of the lower group of coals, it should probably be correlated with one of the coal beds just beneath the falls on the south fork of Barrett Creek. As stated above, a 12-foot tunnel had been driven in this bed beneath the heavy sandstone. The coal at the end of this tunnel is as soft and crushed as that at the surface.

From this opening the party followed up Clear Creek to above the falls, thence up a small tributary from the west where a tunnel 70 feet long had been driven on the south bank of the creek on a $1\frac{1}{2}$ -foot bed of coal, which was badly broken and faulted. The dip of the bed is 40° to the northwest, and the bed is clearly of no value. A short distance from this tunnel there is a bed of coal over 40 feet thick, without partings, exposed on the top and east facing bluff. This coal is soft and crushed throughout and a short distance to the south the bed is perceptibly thinned by a shaly parting. The party did not examine this thick bed, as it had been previously examined by Fisher, who determined its lenticular character.

From the tunnel mentioned we proceeded up a branch of Clear Creek coming in from the northeast past Chezum Cabin to the top of Canyon Creek ridge, thence along the crest of the ridge, where several beds of soft, crushed coal of workable thickness were examined. The soft character of the coals and the inaccessibility of the outcrops render the coals of little value.

From the top of Canyon Creek ridge a study of the broader structural features of the Canyon Creek district was made. In upper

Canyon Creek the coal-bearing beds are badly faulted and broken, so that they are probably of little value as a source of fuel. From Canyon Creek ridge we followed down one of the tributaries of Clear Creek, entering from the northeast, to Clear Creek and returned to Cunningham Cabin.

On the next day, August 27, we followed up Clear Creek to the mouth of Moore Creek, thence up that stream. A short distance above the mouth a poorly-exposed bed of coal was seen which may correlate with the 12-foot bed on Clear Creek. A few hundred feet farther up Moore Creek a 3-foot bed of clean coal was seen crossing the stream and dipping at a high angle. Near the base of the falls we examined three coal beds dipping at angles of 45° to 56° to the northwest, two of which are of workable thickness, but show the characteristic crushed and sheared condition notwithstanding their stratigraphic position, which was immediately beneath a massive sandstone over 300 feet thick. This and many other localities demonstrate that the character of the overlying rock has no bearing on the physical character of the coal.

From here we proceeded up a narrow canyon to the head of Moore Creek and on to the saddle on Cunningham ridge, through which the trail passes. Here two heavy beds of soft, crushed coal had been partly opened up, but the exact thickness could not be measured. The uppermost of these beds has a thickness of about 12 feet, and the other, about 60 feet lower, is approximately 30 feet thick. Below these two beds, which are believed to belong to the basal portion of the upper series, are a number of thinner beds, poorly exposed, on the head of Bear Creek. We followed down this stream past the falls where a bed about 12 feet thick was examined. The coal is bright and clean in appearance, but very soft and friable. Continuing down this stream to its mouth we proceeded up Trout Creek to the cabin, where a new camp was established and preparation made for a detailed examination of all the beds and tunnels in the vicinity of Trout Creek Cabin where considerable prospecting has been done.

SUMMARY.

All of the coals of the Kushtaka formation outcrop within the district covered by the Clear Creek drainage basin. The lowest group outcrops on Clear Creek and below the falls on Barrett and Moore Creeks; the middle group above the falls on Barrett and Moore Creeks, on the extreme headwaters of Clear Creek, and on the crest of the divide between Clear and Canyon Creeks; and the upper group along the southeast face of Cunningham Ridge, near the top.

The coals of the lower group are the most accessible of any in this district. On the lower courses of Moore and Barrett Creeks, and along Clear Creek between the two, there are beds of considerable thickness which could be easily reached, but they dip steeply, so that the greater part of their coal tonnage is below water level. In the district also strike faulting is known to exist in at least two places, opposite the mouth of Barrett Creek and a short distance below the stream.

In quality the coals of this locality possess the naval requirements of volatile content and heat value, but are relatively high in ash. They are badly crushed and sheared and would yield a very large

percentage of slack upon mining. About three-fourths of a mile farther up Clear Creek and below the falls several beds of coal outcrop, presumably belonging to the same group, which showed some of the best analyses of any coal in the district; the position of the beds in the hills also insures a large tonnage of coal above water level. The coals of these beds, however, are all badly crushed and sheared, and in the immediate vicinity is reported a sill of igneous rock, the extent of which is unknown. About 300 feet above the stream bed on the west side is a 45-foot bed of coal which contains benches of excellent coal, but the bed is soft and crushed throughout and its thickness is not believed to be continuous. Less than 100 feet to the south of the 45-foot opening the bed decreases in thickness to 25 feet by the development of shaly members.

The coals of the lower group outcropping on Canyon Creek ridge are all soft and crushed, their outcrops are in inaccessible places, and objectionable faulting is prevalent in the district. Therefore they can not be regarded as worthy of consideration in the present investigation.

The middle group of coals that outcrop on the head of Moore Creek and on the north and south forks of Barrett Creek, also in the southwest face of Cheezum Ridge, are all relatively inaccessible, although they could possibly be reached by a water-level tunnel from Clear Creek. In the above localities the middle group contains thick beds of coal which meet the chemical requirements of the Navy, but the coal is prevailingly soft, crushed, and sheared, and most of the thicker beds contain horsebacks of slickensided bodies of shale which locally render the bed unworkable.

The same objections as to physical character of coal and condition of beds is applicable to the upper group on the southeast side of Cunningham Ridge. These coals are even more inaccessible than the middle group. In view of the above, the coals found throughout the drainage basin of Clear Creek were regarded as unpromising for naval purposes, the most important objections being the soft, crushed condition of the coal, the percentage of impurities in the thicker beds, the faulted and disturbed condition of the coal beds or the rocks in the district in which they are found, and the inaccessibility of the coal beds for mining.

TROUT CREEK DRAINAGE BASIN.

DETAILED DESCRIPTION.

On August 28 the party made a preliminary examination of all coal beds and prospects on Trout Creek. This district, even in advance of the preliminary investigation, was generally regarded as likely to prove worthy of more detailed prospecting, a belief based on previous work of the writer and of Mr. S. S. Smith, supplemented by the conclusions of previous investigations and the results of considerable development work representing private capital.

The work was begun at an outcrop of coal partly opened up, about 300 feet north of the cabin. The exposure was in the point of a ridge 50 feet above the bed of Trout Creek. While this coal bed was of workable dimensions, it was badly crushed and sheared. About 200 feet farther north, on the same side of the creek, there was a tunnel, probably on the same bed, 100 feet long. The bed here had a work-

able thickness at the entrance, but thinned to 18 inches at the face, and exhibited soft, crushed coal at both the mouth and face of the tunnel. No gas was found in the tunnel in the preliminary examination.

From this tunnel we continued up Trout Creek to the waterfalls, where several small beds of coal were poorly exposed in a rather inaccessible gorge. Here the dip of the rocks was steep (50°) and the strike northeast. We returned to the cabin along the west side of Trout Creek, stopping for a brief examination of a tunnel about 200 feet up the slope of the hill. This tunnel, which is 175 feet long, had been driven on a coal bed 5 feet thick at the mouth of the tunnel, but decreasing to 3 feet at the face, and exhibited coal mainly soft, but containing one hard 10-inch band near the top. The characteristics of the bed at the face of the tunnel, where it was under 150 to 200 feet of cover, did not change. No gas was observed in the tunnel at this time.

From here we followed along the west bluff of Trout Creek to the two tunnels opposite Trout Creek Cabin, which were both examined in detail underground. A connection was found between the two, and it was further observed that they had been driven on separate coal beds, the upper one of which was 8 feet thick at the opening. The coal in the lower bed, which appeared to be thicker, was crushed and disturbed, whereas the upper or thinner bed was moderately hard and bright looking at the entrance. It was decided to prospect this 8-foot bed further when the miners arrived, but the thicker bed was obviously too badly crushed and sheared, and the rocks too broken to warrant more extensive prospecting. From these tunnels the outcrop of the two beds was examined in natural exposures for some distance up the hill to the southwest, where more detailed prospecting was done later.

The next locality to be examined by the party was the so-called "30-foot bed" on the west side of Trout Creek, where the most extensive underground prospecting in this part of the field had been done. Here a detailed examination was made of the underground workings and preliminary measurements were made of the coal beds both underground and at the surface. The exceptionally hard and firm character of the coal for a field of this kind was noted and a few hand specimens collected. From this cursory examination it was decided that the bed warranted more surface and underground prospecting in order to ascertain the probable area underlain by a bed of this thickness. The attitude of the bed appeared to be favorable for mining, and the hardness of the coal, judging from the appearance of the ribs and face of the tunnel, warranted the belief that a larger percentage of lump could be obtained from this mine than from any bed previously examined. The quality of the coal was then regarded as of possible desirability for naval use. The result of more detailed prospecting on this bed, both on the surface and underground, is given in the following report by Mr. Williams on the mining conditions in the field.

Continuing downstream below the opening on the 30-foot bed we saw two tunnels opened on beds that were not promising. Returning to the cabin on the east side of Trout Creek, we made a rather doubtful correlation of a 30-foot bed with a coal bed located on the east side of Trout Creek. However, later detailed prospecting by Mr. Calvert proved that this correlation was incorrect, also that a fault in Trout

Creek Valley at this place rendered it very difficult, if not impossible, to correlate with certainty the coal beds across this stream. We also examined another short tunnel opened on a workable bed of soft, crushed coal. As a result of extensive surface prospecting by Mr. Calvert, assisted by several miners, a bed about 500 feet south of the 30-foot opening was selected as a satisfactory bed from which to take the larger sample. This selected bed was later found to decrease in thickness to a few inches, in a short distance. The taking of the large sample from this place was therefore impracticable. Detailed information concerning later development on the west side of Trout Creek is given in a following chapter of this report by Mr. Williams.

On August 29, we moved camp down Trout Creek to the Kushtaka trail and thence over to the lake where we crossed to the rock tunnel on the English company's land. Here a tunnel had been driven about 400 feet, cross-cutting strata that dipped at a steep angle to the northwest and stopping at a fault. Only one thin coal bed, located near the fault, was penetrated by this tunnel. A previous worker in the field reports a bed of coal near the mouth of the tunnel, but a careful search by our party failed to locate it.

From the rock tunnel we followed up the English company's trail to the top of Kushtaka Ridge. About half way up the mountain we examined a short tunnel on a 4-foot bed of soft, crushed coal which, as shown by analysis possesses the requisite volatile matter and a heating value of nearly 14,500 B. t. u., but its position on the hill rendered it very inaccessible from this point. This tunnel, if continued, would probably encounter within a short distance a large strike fault, the location of which is shown on the geologic map.

From here we continued up the hill and, after reaching the top of the first shelf, followed up a short canyon past a 14-foot bed of coal, of which the upper 4 feet was moderately hard, but the lower 10 feet soft and crushed. This bed was on the north limb of a sharp syncline with a corresponding closely folded anticline on the north. This zone of close folding and faulting extends southwest across Kushtaka Ridge into the head of the area drained by Carbon Creek. While the party was climbing to the top of Kushtaka Ridge, several coal openings were found in this disturbed zone. The coal beds seen are generally soft and crushed and the coal measures too badly broken to be considered of importance in the present investigation.

From the top of the Kushtaka Ridge we proceeded down a tributary of Carbon Creek, known as Queen's Creek, to the exposure of a bed of hard, bright-looking coal about 30 feet thick, which was in a closely folded and faulted zone. The extent of this bed is, however, too local to render the bed of value. Hand specimens were collected for the purpose of study, as it exhibited remarkable pressure phenomena. This coal, both in physical properties and chemical composition, would meet naval requirements, but the bed, owing to close folding and erosion, is of too limited extent to warrant mining. From this exposure the party followed down Carbon Creek to the English company's home camp in the edge of the Shepherd Creek Valley.

On August 30 an examination was made of the underground development of the coals in the vicinity of the English company's home camp. One locality visited is situated about 300 yards southeast of the home camp on the east side of a small tributary of Carbon

Creek, indicated on the geologic map No. 1 as No. 64. Here a bed of coal about 19 feet thick and standing nearly vertical had been entered in the footwall by a tunnel 60 feet long, with crosscut through the seam at the face. The coal here was clean and bright, and analyses showed an ash and a volatile-matter content in keeping with naval requirements, and a thermal value of over 14,000 B. t. u. It was soft and friable, exhibiting the characteristic molybdenitic structure of this field. The bed was near a fault with displacement of several hundred feet. The direction of the strike of this bed indicates that it is cut off in one direction at least by the fault within a few hundred yards of the opening.

The next tunnel to be examined was about one-quarter of a mile up Carbon Creek from the cabin on the north side of the creek, where a rock tunnel, crosscutting the beds for a distance of 300 feet, had been driven without penetrating a single coal bed of workable dimensions, one small band being the only coal found. It is believed that this tunnel was intended to penetrate a workable coal bed that is exposed a short distance farther up the creek on either side of the valley. However, a closely-folded anticline, followed by the stream, pitches beneath the stream bed above the point where the tunnel enters the hill. As the local geologic structure had not been understood, the tunnel had been started in the wrong place; that is, too far down the creek and stratigraphically above instead of below the coal bed showing upstream, and consequently the tunnel did not cut it. Considerable water was found in the tunnel, although the structure of the rocks penetrated was unusually regular for this field. The dip of the beds in the tunnel was 60° to 70° . About one-eighth of a mile up Carbon Creek the coal bed is exposed, and appears to be of good quality. Nearly opposite, but slightly upstream from this exposure, a bed of coal believed to be the same, but outcropping on the other limb of the fold, was observed. A tunnel had been driven on it. This bed was examined both at the surface and underground, and the main tunnel was found to be 30 feet long, with one side entry extending about 30 feet. The coal is moderately firm, and appears to be relatively free from impurities, although no analysis of this coal was available. The tunnel was located near a large fault which cuts off the coal measures a short distance away.

We next proceeded up the trail toward the English company's upper cabin and along the line of a large fault which exhibited disturbed structure wherever exposures occurred. At a point marked 60 on the geologic map No. 1 a tunnel 250 feet long, which followed the strike of a 7-foot vertical bed of coal, was observed. The coal was moderately hard, probably owing to its nearness to the fault, and was seemingly of good quality, but was too near the disturbed zone of faulting to warrant further investigation.

From this tunnel the party followed up the trail past the English company's upper cabin near Kushtaka Ridge and down to the English company's cabin on Canoe Landing. About 1,000 feet above this cabin, on the east face of Kushtaka Ridge and at one side of the trail, a short tunnel had entered on the lower 6 feet of a coal bed of considerable thickness, but soft and impure in the upper part. The lower 6 feet of this coal bed was relatively hard, bright, and clean, and on analysis showed the requisite properties for naval use. Although the coal bed at this opening was not readily accessible, being

1,000 feet above the lake, the gradient between the opening and the lake is so steep that a gravity tramway could be installed for lowering the coal to the lake shore. This coal bed may be the same as the one examined 800 feet above the rock tunnel, but lack of exposures between the two openings make such correlation uncertain. After examining the opening the party recrossed Kushtaka Lake and returned to Green Cabin.

From a general reconnoissance of the English company's lands, therefore, it appeared that there are two localities where it seemed advisable that further prospecting be done to determine the regularity of the coal-bearing measures and the continuity and prevalent character of the coal beds contained therein. One of these areas, where it is possible that there is an undisturbed body of coal sufficiently large to warrant mining, is on the east side of Kushtaka Ridge above the cabin and the rock tunnel. This area lies in a fault block one-half to three-fourths of a mile wide, but if further exploitation demonstrates that no minor disturbances exist in this fault block, and the bed examined at No. 48 (see map No. 1) maintains a uniform thickness over this area, a considerable tonnage of coal could be taken out. The other area where more extensive prospecting might be justified lies on the northwest side of Carbon Creek under Carbon Creek ridge, which, for the most part, is composed of the Kushtaka, the principal coal-bearing formation, but is capped by the Tokun formation, which does not bear coal. This ridge appears to be free from major faulting, and as its southeast face is composed of the upper half of the Kushtaka formation, coal beds should be present in this bluff. If the face of this ridge, after further prospecting, should be found free from structural disturbance, and the beds to be uniform, a body of coal land 1 square mile in extent might be found in this ridge. The coal examined in the valleys of Carbon Creek and its tributaries, Ocean and Leeper Creeks, are in a zone of too complex structure to warrant development on a large scale.

CANYON CREEK DRAINAGE BASIN.

On August 31 we proceeded from Green Cabin at the mouth of Stillwater Creek up Canyon Creek to Hunt Cabin, examining local folding of the strata and faulting on either side. From the cabin we followed up a small canyon to the east, a distance of about one-eighth of a mile, where the principal development of the coals of this area has taken place. Here much machinery had been installed and a tunnel driven a distance of about 400 feet under several hundred feet of cover. The bed opened has a total thickness of 11 feet and dips at a high angle. Only the upper 3 to 4 feet is sufficiently clean to be considered. This coal was soft and friable, and at the surface the bed is unpromising in appearance. In examining the tunnel six different places were noted where minor faulting had shifted the bed out of position or caused it to thin materially. In the judgment of the engineers of the party this bed, from surface indications alone, did not justify the amount of money that had been spent in its exploitation. About $1\frac{1}{2}$ miles east of this locality, on the southeastern slope of Carbon Mountain, there are a number of coal prospects which were not examined at this time owing to the fact that they had been previously examined by Mr. Smith, a member of

the party, and were known to exhibit soft, crushed coal, highly inaccessible and of a quality not suited for steaming purposes; that is, having a volatile matter content considerably lower than 12 per cent, which places them in the anthracite variety.

On the whole, the coals of the Canyon Creek basin were regarded by our party as unpromising as a source of naval coal because, as stated above, they are too near the anthracite variety to be desirable for steaming purposes, and the structure of the coal-bearing measures is too badly broken to justify the hope of finding a large body of undisturbed coal.

THE M'DONALD AREA.

September 1 our party went down Bering River by motor boat to the mouth of Bering Lake, thence across that lake to the McDonald home camp, where we examined the so-called McDonald mine. This mine was formerly well equipped for taking out coal, and a tunnel had been driven into the hill at a point about 300 feet above the lake on a 6-foot bed of impure coal. Several minor faults in this tunnel materially damaged the coal bed. After thoroughly examining both the surface and the underground conditions of this mine, it was the consensus of opinion that this bed should not have been opened, for with the most favorable equipment it is very doubtful whether coal in considerable amounts could ever be mined at this place from the present opening. The percentage of slack from this mine was very large, probably over 90 per cent of the entire output. An opportunity was here afforded for the examination of the behavior of this coal in the furnace, and samples were collected from the fire box. It was observed that the coal, when beginning to burn, fused and caked, "bridging over" in such a manner as to prevent the fuel from packing down and smothering combustion. We were informed by the engineer who had been burning this coal that if special precaution was taken to feed the fire box slowly at first, allowing time for the "bridging over," little difficulty was experienced thereafter in using the slack coal under stationary boilers.

Two other small openings had been made in coal beds a short distance south of the McDonald mine. These openings did not extend more than 30 feet into the coal bed, which in both localities is soft and crushed and is about 4 feet thick. Coals adjacent to the McDonald camp are of a quality suitable for naval purposes, but the beds examined are either too thin or too badly disturbed to warrant further development. On top of the ridge a short distance south of Mount Hamilton some coal openings have been made which were not examined in the party's reconnaissance, as they were regarded too inaccessible for practical purposes. At Poul Point a thin bed of coal had been opened by a short tunnel, but had proved to be below minable thickness.

DETAILED PROSPECTING ON TROUT CREEK.

(Map No. 2.)

As stated in a previous chapter of this report, the object of the general examination of the entire Bering River field by Messrs. Fisher, Calvert, Williams, and Smith immediately after their arrival at Katalla and preceding the arrival of the mining force from Seattle

was to ascertain the most desirable locality or localities from which to take one or more large samples of representative coal for a practical Navy test. In this general examination every essential factor was taken into consideration, such as quantity and quality of coal and accessibility. The Tenino claim of the Cunningham group was finally selected. This claim is traversed from north to south by Trout Creek, thus affording easy access to the coal, as there is a readily available passageway to and from tidewater. Moreover, there appeared to be at this locality the greatest quantity of available coal of the physical and chemical character required for Navy use. Opposite the Cunningham Cabin on Trout Creek an 8-foot bed of hard coal had been opened, and about 850 feet farther downstream a 30-foot bed of similar coal had likewise been developed by a prospect entry. Nowhere else in the field could beds of such thickness combined with the desired physical character be found. At that time it was not known that the desire of the Navy Department was to obtain representative rather than exceptionally hard coal.

The locality mentioned having been selected, it next became incumbent to ascertain by surface prospecting what underground conditions would be likely to be encountered in actual development. Accordingly the respective lines of outcrop of the two beds on the west side of Trout Creek were carefully traced by means of closely placed prospect pits. This work was done under the supervision of Mr. Calvert, first with the aid of local residents employed for the task, and later, upon the arrival of the mining force from Seattle, by an addition of such men as were immediately available. It was soon ascertained that the 8-foot bed west of Trout Creek could not be regarded as of prospective value, for within 600 feet of the original prospect entry it decreased to 16 inches. In addition the coal was dirty. Attention was then directed to the 30-foot bed which was stratigraphically lower. Some difficulty was experienced in tracing the line of outcrop to the southwest, as a thick mantle of talus and tundra effectually conceals the underlying rocks in that part of the field except for very rare exposures. The bed was uncovered, however, several hundred feet southwest of the nearest exposure by digging a trench some 60 feet long and 10 feet deep. Here the coal was shown to decrease to 18 feet and to be materially changed in character, resembling the usual soft coal of the field. At a point still farther to the southwest, probably about 1,000 feet from the original prospect tunnel, the bed was found to lessen to 4 feet of soft, dirty coal.

It having thus been demonstrated that the two beds in question are lenticular west of Trout Creek, endeavor was made to find the extension of those beds to the east. Trenching back of the cabin failed to disclose the 8-foot bed at its expected location, and a similar failure resulted in regard to the eastward continuation of the 30-foot bed. A coal bed outcrops on a ridge opposite the tunnel opening on the 30-foot bed, and at first it was considered to be the eastward extension. When opened, however, it was found to be only a 3-foot bed, faulted and badly crushed. A 32-foot bed had been reported by Storrs as outcropping on the south bank of the west-flowing stream entering Trout Creek about 500 feet below the prospect tunnel on the hard, 30-foot bed. When it had been ascertained that the 30-foot bed does not occur at its expected location on the east side, the coal mentioned by Storrs was assumed to represent the true eastward exten-

sion, faulting having offset the outcrop to the extent indicated. This exposure was carefully faced up after considerable labor, and it was found that only 6 feet of soft, slickensided coal is in reality present. The dip of the rocks, together with the topography at this locality, accounts for Storrs's error, for without careful and complete facing the bed presents every appearance of being fully the thickness assumed. At the time of Calvert's departure from the field a transit survey was being made to locate accurately the prospect pits and outcrop lines on or near Trout Creek, but at the date of completion of the present report the resulting map is not at hand. The distances cited should be considered, therefore, as only closely approximate. This map accompanies the report by Mr. R. Y. Williams regarding mining conditions.

In addition to the prospecting described in the foregoing paragraphs, every previously known exposure of coal on either side of Trout Creek was visited, faced up where necessary, and the bed examined. It was found that a short distance east of the creek the structure becomes complex in passing toward Bear Creek, for the rocks are much disturbed, and coal beds, where found, are badly crushed. The lower group of coals outcropping near the west side of the Adams claim of the Cunningham group was examined, but the coal appeared to be too impure to be of special value. A 6½-foot bed, previously undiscovered, was opened on the east side of Trout Creek opposite the 6-foot bed mentioned in the preceding paragraph. This bed appeared to be clean, and, although soft, was considered likely to yield a fair proportion of small lump coal. In spite of the steep dip (60°) the relation of the outcrop to the topography is such that it could be opened up readily near the level of Trout Creek, and a sample of considerable size presumably obtained. In view of the fact that this bed was considered as fairly representative in physical character of the average coal of the field possibly adapted for Navy use, it was finally selected as the one to be developed. Reports received subsequent to the departure of the geologists from the field, however, are to the effect that this bed proved a disappointment, owing to the structure encountered. This condition, though not fully foreseen, is not surprising, as it merely represents what is to be expected in underground development of any bed in the entire field.

CONCLUSION.

In conclusion the writer must state that in his opinion the current impression of the commercial value of the Bering River coal field is greatly exaggerated, owing mainly to a mistaken idea of local conditions in the field itself. It must be granted that the first impression gained by a hasty traverse of the various natural passageways across the field is that coal is abundant, for the streams crosscutting the coal measured expose beds at numerous places. Examination of many of these exposures is likely, moreover, to disclose the fact that the coal is for the most part of great purity, not usually being associated with bone or streaks of dirt as in other well-known fields; shaly beds and local shaly bodies or horsebacks are the most common form of impurity in the coals of this region. Chemical tests also bear out the feature of purity, as most analyses show a low ash content and a high calorific value. Other factors besides purity and seeming abun-

dance are necessary, however, for the successful commercial development of any coal field, and it is with respect to those necessary factors that the general public has been misinformed.

In regard to the quantity of coal, it is undoubtedly true that in the aggregate the tonnage of the Bering River field is very large, but the notable lenticularity of the beds introduces a very uncertain factor. This factor has been recognized by various geologists who have visited the field, but a conclusion has been drawn therefrom to which the writer can not subscribe. The belief appears to have been that although the coal is likely to pinch out at any locality, there will be other localities where it will thicken sufficiently to counterbalance that effect. This line of reasoning would be more tenable could it be demonstrated that wherever a barren locality is encountered in underground workings the coal will reappear in normal or increased thickness a short distance beyond. In reality, however, reappearance at the same stratigraphic horizon seems improbable. No well-managed company would be likely, therefore, to risk the large expenditure necessary to drive far through barren strata to prove actual underground conditions. A good illustration of such conditions is displayed in connection with the 8-foot bed opened near the Cunningham Cabin on Trout Creek, to which reference has been made elsewhere in this report. Moreover, this condition is almost certainly the normal one in the field and should not be considered at all exceptional.

In regard to the physical character of the coal, with the exception of the anthracite district of Carbon Mountain, along the axes of close folds and in the immediate vicinity of large faults, the coal is soft and incoherent, so much so that it can usually be shoveled direct from the face. A considerable amount of coal from the McDonald mine—and this coal contains a larger percentage of small lump coal than the average of the field—was used in locomotives during the period of railroad activity near Katalla. It is claimed on what is considered good authority that the coal failed to remain on the grate under the slightest forced draft—a feature, if true, that would probably make it undesirable for use on naval vessels.

In regard to the cost of mining, even disregarding the frequent pinching out of the beds, the coal could be extracted only with an excessively high cost. Practically every drift or entry in the field discloses one or more faults, necessitating a large amount of dead work. Usually the roof is unsafe and requires careful timbering. The incoherent character of the coal, moreover, combined with the steep dips, causes a very unsatisfactory condition. The coal is so soft that excessively large pillars must be left to support the roof, thus greatly decreasing the amount available for extraction. The coal is apt to creep down the rise into the main entries, crushing any but the most substantial timbers. It is difficult to estimate the actual cost of mining the coal of this field, but every factor involved is such that it is certain to be much greater than is the case with the development of the coal fields in the States.

It is not the intention of the foregoing statements to convey the impression that the Bering River coal field is entirely without value. Fuel is there of good quality chemically and in large aggregate amount. In the writer's opinion, however, the best utilization of the coal will

be to make it into coke and then to use it to smelt Alaskan ores of too low a grade to stand shipment to present smelting centers. The coke would most certainly be costly, but even so it might be used with economy in the manner suggested. Also, the soft, coking coal of the field might be briquetted to form an ideal domestic or steam fuel, but here again the cost would be prohibitive under present market conditions.

TRANSPORTATION OF BERING RIVER COAL SAMPLE FROM MINE TO TIDEWATER.

TRANSPORTATION OF COAL TO TIDEWATER.

The sacked coal was stowed in piles near the tunnels along Trout Creek. A wide sled trail with easy gradients was constructed from this point to the nearest navigable water—a point on Stillwater Creek about 5 miles distant. During the winter of 1912-13 the coal was sledded to this depot by means of double-end horse sleds, which carried about 2,000 pounds to the load. The actual sledging began January 15, 1913, and was concluded April 17, 1913. The late start was due to continued soft weather, and the progress of the work was seriously delayed at times by periods of thaws and rains. To accomplish this work 7 horses and sleds and 10 men were employed. This feature of the transportation was under the immediate charge of Hospital Steward R. Aikman of the Navy.

From the depot on Stillwater Creek the coal was transported to Chilkat, a point near the mouth of the Bering River, in boats, during the summer of 1913. The Chilkat depot was about 21 miles from the Stillwater depot.

Before the expedition took the field freighting on the Bering River had been limited to rather small consignments, and this was transported either in poling boats by "lining" or "tracking" them against the current or in small power boats. The expedition had a considerable tonnage to handle (about 300 tons upstream and about 800 tons downstream), so it was necessary to carry out some river-improvement work. Docks were built at Stillwater and Chilkat depots, and in several instances wing damming was undertaken to confine the river. The first $7\frac{1}{2}$ miles of the river downstream from the Stillwater depot is a typical glacial stream of what was a delta region. The river was spread over great alluvial flats formed largely by the deposition of glacial silt and detritus and divided into many narrow shallow and tortuous channels. This was a region of innumerable sandbars and areas of quicksand. Considerable difficulty was encountered in navigating this division of the river. The lower $7\frac{1}{2}$ miles of the river, or below Bering Lake (a tidal lake), was tidal and did not present any difficulties whatever.

On account of the variation in the depth of water in different sections or divisions of the river several handlings of the coal were necessary. The coal was loaded into large boats at the Stillwater depot. At the entrance to the delta region the coal was transferred to small shallow-draft boats, which were necessary to cross the bars. At the beginning of tidewater it was transferred to barges. The first coal arrived at Chilkat on June 23, 1913. The entire amount was delivered by July 29, 1913.

The coal mined by the expedition, which totaled about 600 tons, was delivered to the U. S. S. *Maryland*. Fifty tons were reserved for shipment to the Engineering Experiment Station at Annapolis, while the balance was consumed in steaming tests on board that vessel. The *Maryland* anchored in the Okalee Channel of Controller Bay, at a point about 10 miles from Chilkat depot. The coal was delivered alongside in barges. The total amount of coal lost in the entire transportation was about 9 tons, which is a surprisingly small amount and a very creditable performance on the part of the management. In all 33 boats and barges were used in the river transportation, 21 of which were built in the field by the expedition out of lumber milled on the ground. This total includes tenders for the large power boats and river skiffs used during the river-improvement operations. Thirteen of these boats were equipped with power, seven of which were built and the engines fitted or installed in the field. Engines were installed in two other power boats. Two large power boats and two barges were built at the navy yard, Puget Sound, and shipped to Alaska.

The boat-construction work was accomplished by a force of men detailed from the U. S. S. *Maryland*, under the direction of Lieut. Commander Mark St. C. Ellis, United States Navy, and Chief Carpenter A. W. Jones, United States Navy.

It was the original intention to sled the coal from the mines to tidewater during the winter, as it was thought this would give less difficulty than the river transportation. The many rains and thaws, during which the snow practically disappeared, precluded all possibility of utilizing this method.

This transportation of the coal from the tunnels along Trout Creek to tidewater was under the charge of Passed Asst. Surg. John O. Downey, United States Navy, who had been the representative of the Navy Department and the department fiscal agent during the mining operations.

COMPARATIVE STEAMING TESTS POCAHONTAS AND BERING RIVER COAL, CONDUCTED BY U. S. S. "MARYLAND."

1. The U. S. S. *Maryland*, an armored cruiser of 15,138 tons full-load displacement, was designated to conduct the comparative steaming tests of Pocahontas and of Bering River coals. This vessel has the following characteristics: Length over all, 503 feet 11 inches; beam, 69 feet 6½ inches; mean draft, 24 feet 1 inch; speed on trial, 22.41 knots; displacement on trial, 13,749 tons; bunker capacity to bottom of beams (43 cubic feet to the ton), 2,054 tons; main engines, 2 vertical 4-cylinder triple expansion; cylinder diameters, 38½ inches, 63½ inches, and 74 inches; stroke, 48 inches; boilers, 16 B. & W.; total grate surface, 1,600 square feet; total heating surface, 70,944 square feet; indicated horsepower of propelling machinery and auxiliaries on trial, 28,059.

2. The Bureau of Steam Engineering issued the following instructions for the comparative trials:

WASHINGTON, D. C., April 16, 1913.

From: Chief of Bureau of Steam Engineering.

To: Commanding officer of U. S. S. *Maryland*.

Subject: Instructions for steaming tests Bering River (Alaska) coal.

1. The bureau has been informed by the department that the U. S. S. *Maryland* will conduct the steaming tests to be held with Bering River coal recently mined in Alaska, and has been directed to draw up instructions for the tests.

2. At the present date this coal is in bags at Stillwater Creek awaiting the breaking up of the winter ice so that transportation to Controller Bay will be possible. Further notice will be given when the coal has arrived at Chilkat (Controller Bay), inasmuch as an estimate of time to bring the coal down the Bering River is hard to make at present.

3. In order to insure this coal being thoroughly cleaned, the bureau desires that the coal be inspected either before loading on the barges or upon arrival on board. Such cleaning as may be necessary shall be done in order to bring the coal up to a standard of well-cleaned run-of-mine. Also the bureau desires special inspection of the lump coal which was obtained from one of the mines in order to note its friability and the breakage in handling. This lump coal has been kept separate from the remainder of the coal for just such an inspection. After inspection this coal should be mixed with the remainder so that the entire lot may be of about the same grade. The number of cubic feet to the ton should be ascertained and reported.

4. The bureau desires two complete sets of tests, one to be with run-of-mine Pocahontas coal and the other with Bering River coal. Each set of tests shall consist of—

(I) An uninterrupted period of not less than seven days in port, during which time steam shall not be upon the main engines for any purpose. The auxiliaries in use shall be the same in both series of tests, equal duty to be performed. If any discrepancy unavoidably occurs, it shall be noted and allowance made therefor as noted below.

(II) A test at sea with not more than three-fourths boiler power and at a speed of about 15 knots. This test to last 24 hours.

(III) A test at sea under full boiler power at a speed of 20 knots. This test should last 4 hours.

(IV) A test at sea at a speed of 10 knots for a period of 48 hours.

The sequence of these four features of the test will be determined by you, but the sequence adopted for the first test must be followed during the second test.

5. Upon receipt of each coal to be used in these tests, samples for chemical analysis will be taken and forwarded to the Bureau of Steam Engineering. Care must be used to make these samples represent as nearly as possible the average of the entire lot of each coal. To this end small samples (shovelful) should be taken throughout the coaling, the small samples to be placed in one pile, divided into quarters, and two of the quarters rejected, the other two to be crushed, this quartering and crushing to continue until a final sample of about 4 pounds is obtained. This is the sample for transmittal in a sealed receptacle to the bureau for analysis.

6. The bureau desires that all data of the tests be prepared by a board to be appointed by you, with instructions to include all the data called for herein, arranged in tabular form.

7. Should there be any difference in the auxiliaries used and duty performed by them, the board should allow therefor.

8. In the tests underway every effort shall be made to keep the revolutions corresponding to the prescribed speeds constant. Should discrepancy between the two tests unavoidably exist, the board should reconcile coal consumption by the formula laid down in the Rules for Engineering Competitions.

9. During the four-hour full-speed runs indicator cards should be taken once per hour; in the other runs, once per watch. The pounds of coal per horsepower should be computed by the board and entered in an appropriate column of the tabular report. The cruising radius at each speed should be calculated and reported.

10. Copies of the engineer's log for the period of the tests should be submitted. The results of flue-gas analysis should also be reported.

On each test all data required by the Rules for Engineering Competitions should be taken.

11. During the entire period of the test the strictest care must be taken to preserve the absolute accuracy of the coal accounts. The weight of the coal as originally received must be checked in as many ways as possible. These checks must be detailed in the board's report. The weight of the coal, as used on board ship, should be checked by frequent weighing of the buckets, as well as by inspection of the bunkers. The weight of the ash must be obtained accurately. The ash should be weighed dry, and not wet. The amount of clinker should be especially reported upon, and the board should attempt to determine the exact weight of the clinker. Any special difficulties in firing, or any special methods used in firing, should be described in the board's report.

12. During each test the bureau requests that particular attention be paid to the effect upon the grate bars of the different kinds of coal used. The number of grate bars that it is necessary to renew in order to put the boiler furnace in a fit condition for further general use shall be noted at the conclusion of each test and the result shall be included in the board's report. The bureau further desires to be informed concerning the amount of soot deposited on the boiler tubes. In each test special statements should be made of the frequency with which it is found necessary to clean the boiler tubes. The report should also state the relative amount of smoke made by the different kinds of fuel and the effect upon boiler casings of burning the different fuels. In reporting the amount of smoke use the Ringelmann scale and submit smoke records, together with appropriate photographs showing extreme and average conditions.

13. In view of the fact that the characteristics of Bering River coal, so far as giving off of explosive gases are concerned, is unknown, extra precautions should be taken in entering bunkers.

14. In every test the report should include a complete description of any unusual characteristics or peculiarity of the fuel that is tested. If, for example, any tendency to spontaneous combustion is noted, or if any special case or difficulty in handling or stowing is experienced, or if any peculiar good or bad qualities are exhibited, the board's report should include a detailed statement of those qualities.

15. The report of the board should in each test include a specific recommendation stating whether or not the coal tested is recommended for future and more extended tests to determine its value for general naval use under standard service conditions.

16. At this time it is impossible to state definitely the quantity of Bering River coal that will be landed on board the Maryland. The conditions of transportation are such that loss of some of the coal may be expected. The order and length of the different portions of the test are, therefore, left to the discretion of the commanding officer. The complete full-power run must, however, be made, together with such preliminary work as will allow the firemen and water tenders to develop methods of firing this new coal.

17. The bureau wishes a complete description of the action of the coal on the grate, and the methods of firing. As many photographs as possible should be submitted in

order to show the general appearance of the coal when received, the character of the ash and clinker, the effect on grate-bar casings and uptakes, smoke, and (if possible) the appearance of the coal on the grate.

18. In order that the Pocahontas coal received may not be unduly weathered, Pocahontas coal cargo recently received should be taken on board at Tiburon or at Mare Island.

19. Attention is invited to the importance of the test of these coals, and to the necessity of care in taking and preparing the data. The Bering River coal represents a considerable outlay of money. Moreover, the report of the suitability or nonsuitability of this coal for naval use will have important bearing on the source of supply of coal for the Navy; and, possibly, will affect the interests of many citizens of the country. It is, therefore, requested that all operations of the vessel be made secondary during these trials in order that the tests may receive the undivided attention of the board.

H. I. CONE.

3. The board referred to in the letter of instructions was composed of the following officers: Capt. John M. Ellicott, United States Navy; Lieut. Milton S. Davis, United States Navy; Lieut. Herbert E. Kays, United States Navy.

This board conducted the trials with Pocahontas coal. Capt. John M. Ellicott, United States Navy, having been detached from the command of the *Maryland* prior to the Bering River tests; Commander Philip Andrews, United States Navy, served as senior member during the last-mentioned tests and also on the four-hour, full-boiler power, Pocahontas run.

COAL USED ON THE POCAHONTAS TESTS.

4. The coal used during the Pocahontas port test, 15-knot test, and 10-knot tests was received from the naval coal depot, Tiburon, Cal., on May 3, 1913. This depot had received this coal on March 14-19, 1913, and March 20-27, 1913, from the chartered colliers *Inveran* and *Georgian*. These colliers had, in turn, received this coal at Lamberts Point, Va., on January 11-13, 1913, and January 22-24, 1913. The coal was from the following mines: Lynchburg, Page mines, Nos. 1, 2, and 3; Crozer, Nos. 1 and 2; Superior Pocahontas, No. 1; Goodwill, Nos. 3 and 4; Powhatan, Louisville, No. 1; Upland, Pawana, Nos. 1 and 2; Greenbrier.

Analysis of representative samples of this Pocahontas coal gave the following results:

Moisture, as received.....	per cent..	2.50
Volatile.....	do....	19.10
Fixed carbon.....	do....	74.60
Ash.....	do....	6.30
Sulphur.....	do....	.70
British thermal units.....		14,630

At the end of the trials the board reported this coal to contain but a small percentage of lump; that the loss through the grates was small, and that it was found to be an excellent steaming coal, requiring only moderate working and not clinkering badly.

The Pocahontas coal used on the four-hour full-boiler power run was received from the navy yard, Mare Island, Cal. This coal had been delivered at Mare Island by the steamer *J. A. Hooper*, which steamer had in turn been loaded at Lamberts Point, Va., on December 2-3, 1912. This coal was from the following mines: Empire, Virginia, Pocahontas, Arlington, Central, Turkey Gap, and Hia-

watha. Analysis of representative samples of this coal gave the following results:

Moisture, as received.....	per cent..	2.30
Volatile.....	do....	17.90
Fixed carbon.....	do....	73.70
Ash.....	do....	8.40
Sulphur.....	do....	.54
British thermal units.....		14,330

At the end of the trial the board reported this coal to be of excellent quality, with a moderate amount of slack and not weathered; and that little ash and clinker resulted therefrom.

COAL USED ON THE BERING RIVER TESTS.

5. This coal was the Bering River coal, received by the *Maryland*, at Controller Bay, on July 31-August 3, 1913, as previously noted. This coal when received was exceedingly wet and had not been satisfactorily cleaned. The board noted that the lump was clean, bright, but friable; that the lumps were generally free from coal bone; but that the slack appeared to include sand or powdered shale or slate. Analyses (moisture free) of two representative samples of the coal, taken while loading at Controller Bay, as laid down in the instructions from the Bureau of Steam Engineering, gave the following results:

	Sample No. 1.	Sample No. 2.
Volatiles.....	17.70	16.70
Fixed carbon.....	61.90	59.90
Ash.....	20.40	28.40
Sulphur.....	.65	.60
British thermal units per pound.....	12,180	11,700

The moisture content taken by the board was 5.2 per cent.

In view of the necessity of drying and recleaning, the coal was loaded into empty bunkers and taken to the navy yard, Mare Island, Cal., where it was unloaded and subjected to four screenings, the smallest mesh being one-half inch. The slack was not washed. All coal was dried, the resulting analyses of 10 samples showing as follows:

Kind.	Percent- age.	Moisture.	Volatile.	Fixed carbon.	Ash.	Sulphur.
Lump.....	10.0	0.40	17.25	79.16	3.09	.....
Nut.....	12.5	.83	17.50	79.44	2.33	0.72
Pea.....	31.0	.50	16.65	73.07	9.78	.....
Slack.....	46.5	.90	15.62	55.82	27.66	.....

The percentages quoted refer to the total weight prior to picking out 1.7 per cent slate and removing about 4.5 per cent of moisture by drying.

The coal having been dried and cleaned, it was placed on board the *Maryland* for test.

The composite analysis of this reclaimed and dried coal is as follows:

Moisture.....	0. 73
Volatile.....	16. 34
Fixed carbon.....	66. 44
Ash.....	16. 49

SEVEN DAYS' PORT TEST.

6. The seven days' port test with Pocahontas coal was held from 8 a. m. May 5 to 8 a. m. May 12, 1913, and with Bering River coal from 8 a. m. August 14 to 8 a. m. August 21, 1913. Boiler No. 8 was used in both cases; the load on the ship being the same in both cases, the difference being only one-third of 1 per cent. The coal, water, ash, and clinker were weighed and accurately tallied.

The same grade of run-of-mine coal was used during the entire week that Pocahontas coal was tested. During the Bering River port test screened lump was used for two days, run-of-mine for two days, and slack for three days.

The comparative results of these tests are as follows:

	Average water evapo- rated per day.	Average coal per day.	Average coal per day equal duty.	Percent- age of ash and clinker dry.	Percent- age clinker in ash.	Smoke density (Ringel- mann).	Average CO ₂ .	Relative efficiency.
Pocahontas run-of- mine.....	<i>Gallons.</i> 35,616	<i>Tons.</i> 13,470	<i>Tons.</i> 13.47	11.04	27.8	0.9	8.41	100.0
Bering River screened lump.....	36,442	17,412	16.97	25.55	53.7	1.1	10.95	79.4
Bering River run-of-mine.....	37,813	20,021	18.80	30.85	42.95	1.1	11.00	71.7
Bering River slack.....	33,092	20,509	22.01	39.07	40.40	.8	8.9	61.2

The final comparative results, reconciled for equal duty, are as follows:

Kind of coal.	Tons of coal used equal duty.	Compara- tive efficiency.
Pocahontas.....	94.201	<i>Per cent.</i> 100.0
Bering River.....	136.840	68.9

CONCLUSION.

Neither the screened lump, the run-of-mine, or the slack Bering River coal is the equal of Pocahontas coal for this duty.

FOUR-HOUR, FULL-POWER, FORCED-DRAFT, 20-KNOT TRIALS.

COAL USED.

Pocahontas run-of-mine and Bering River run-of-mine, as previously described.

TRIAL WITH POCAHONTAS COAL.

This trial was held on August 29, 1913, from 11 a. m. until 3 p. m. All boilers were in use under moderate forced draft. The 20-knot speed was maintained with the greatest ease and with little effort on

the part of the firemen. There was but little ash or clinker, and the boilers were fairly clean at the end of the run. The smoke was heavy and black, with a moderate amount of cinder.

TRIAL WITH BERING RIVER COAL.

This trial was held on August 26, 1913, from 3 p. m. to 7 p. m. All boilers were in use with 2 inches air pressure. Clinkers and ash in excessive quantities were produced. Every effort was made to make a speed of 20 knots, the firemen working to the point of collapse. Constant removal of clinker was necessary. The average speed made was 18.6 knots, the highest attained being 19.3 during about 15 minutes of the time, while using lump coal. No damage to boilers or uptakes was found after the trial. Two grate bars were renewed.

The absence of smoke on this forced-draft run was remarkable, and in contrast with the heavy black smoke noted on the Pocahontas run. The smoke from Bering River coal was light brown, almost transparent, easily dissipated, and in general less pronounced than that ordinarily made in port by the *Maryland*.

With fires sufficiently thin for good combustion steam could not be maintained, and much coal fell in the ash pans. After the coal had coked, it packed into a solid bed, which offered resistance to the air so as not to admit sufficient air for good combustion. Where air currents found their way through the coal, bed clinkers formed very rapidly. Some clinkers were of such size as to require breaking up before they could be removed through the furnace doors. The coal was generally slack, with few lumps.

The comparative data of these trials are set forth in the following table:

	Pocahontas.	Bering River.
Average speed, knots.....	20.2	18.86
Coal used, tons.....	79.1	127.3
Coal used, equal duty, tons.....	79.1	1184.7
Per cent ash and clinker, dry.....	8.8	26.8
Per cent clinker, in ash.....	4.7	17.4
Smoke density, Ringelmann.....	2.4	1.5
Per cent CO ₂	8.3	5.9
Average temperature uptakes, °F.....	688	551
Average indicated horsepower, main engines.....	20,820	12,922
Pounds coal per indicated horsepower, based on indicated horsepower of main engines only.....	3.14	5.00
Knots per ton, at 20.2 knots.....	1.02	.637
Coal, cubic feet per ton.....	39.9	39.53
Cruising radius, 20.2 knots speed.....	2,257.7	989

¹ Based on indicated horsepower, given in tenth line, taking 639 as the indicated horsepower of auxiliaries in use with Pocahontas and 789 with Bering River, and assuming that the total coal will be in proportion to the total power actually developed and the total power necessary for 20.2 knots.

The final comparative results are as follows:

Kind of coal.	Coal used, equal duty.	Relative efficiency.
Pocahontas.....	Tons. 79.1	100.00
Bering River.....	184.7	62.83

CONCLUSIONS TO BE DRAWN FROM THIS TEST.

1. Full speed can not be maintained with Bering River coal. A speed of 18.56 knots was all the ship's force could make on this trial with this coal. This represents only half the power necessary to drive the ship at full speed.

2. The quantity of ash and clinker produced by Bering River coal and the necessity of constant clinkering of fires throws such exhausting work upon the personnel as to make impossible moderate speed except for a short period.

3. Bering River coal is far superior to Pocahontas in smokeless qualities.

4. Although the firing appears to have been better with Pocahontas coal than with Bering River, the discrepancies in coal consumptions are so great that it can not be expected that Bering River coal can compare in efficiency with Pocahontas.

CONCLUSION.

Bering River run-of-mine coal is unsuitable for use with forced draft in naval boilers.

24-HOUR THREE-FOURTHS BOILER POWER, 15-KNOT TESTS.

WITH POCAHONTAS COAL.

This run was made from 6 p. m., May 12, 1913, to 6 p. m., May 13, 1913. Boilers 1-10 were in use under natural draft. Fires were carried from 7 to 8 inches thick. One grate bar was renewed. Loss of coal through grates negligible. There was no noticeable effect on boilers or uptakes.

WITH BERING RIVER COAL.

This run was made from 12 midnight to 12 noon August 27, 1913. Due to the large expenditure of coal this run was shortened to 12 hours. Boilers 1-14 were tried, but it was found that they could not make enough steam to maintain a speed of 15 knots, so two more boilers—all boilers—were added. Fires were carried from 5 to 8 inches thick with natural draft and 8 to 10 inches with forced draft, it being necessary to run some of the blowers. At the beginning of the run the loss through the grate bars was estimated at 40 per cent, as the coal was very slack. Later, the loss became very low. Two grate bars were renewed. After the run there was no noticeable effect on the uptakes and stacks, though the temperatures were higher in general than with Pocahontas coal. There was an accumulation of soot and fine ash all through the tubes, and the boilers were found to be dirty. Nine anchor clamps, 4-inch tubes to casing, were burned off, one baffle door was warped, and one cast-iron block between center 4-inch tubes was burned. There was no sagging or bulging of tubes, and no warping or displacement of flame plates.

The fires clinkered badly and great quantities of ash were produced. The clinkers were very easily broken, but it was necessary to remove them almost continually from the fires.

The comparative data of these trials, reconciled for the same length of time, are set forth in the following table:

Kind of coal.	Pocahontas.	Bering River.
Average speed, in knots.....	15.10	14.66
Coal used, tons.....	76.58	160.30
Revolutions per minute.....	86.2	82.9
Per cent ash and clinker, dry.....	7.6	35
Per cent clinker in ash.....	23.1	10.9
Smoke density, Ringsblom.....	1.25	.6
Average CO ₂	7.8	4.4
Average temperature, uptakes, °F.....	347	426
Coal, cubic feet per ton.....	42.23	39.83

Reconciled for equal duty, the results are as follows:

Kind of coal.	Coal used, equal duty, 15.1 knots.	Relative effi- ciency	Knots per ton at 15.1 knots.	Cruising radius, 15.1 knots.
Pocahontas.....	76.58	100	2.37	4,956.8
Bering River.....	173.3	44.2	1.05	2,317.8

In anticipation of making the tests much earlier, the run with Pocahontas was made three months earlier than that with Bering River coal, which would tend to make the result with the latter less favorable in point of speed and indicated horsepower than it should have been, due to the longer time out of dock. The indicated horsepower of the main engines reported with Pocahontas was 7,083, and that with Bering River 7,600, but investigation of the data shows that the latter figure was the indicated horsepower for the last nine hours of the test, during which the revolutions per minute averaged 85. During the first three hours the revolutions varied from 71.3 to 83.1 and it is probable that the average indicated horsepower for the 12 hours did not exceed 7,350. Under identical conditions, there would, therefore, be necessary a slight correction for Bering River, which would not make any material difference in the figures above recorded.

CONCLUSIONS TO BE DRAWN FROM THIS TEST.

1. The percentage of ash and clinker in Bering River run-of-mine is excessive, thereby throwing exhausting work upon the personnel.
2. More boiler power, and to a certain extent forced draft, had to be used with Bering River coal for equal duty. Although the firing appears to have been better in the Pocahontas test than in the Bering River, the discrepancy in coal consumption is too great to allow a hope for results with Bering River coal that may in any way compare favorably with those attained with Pocahontas.
3. Bering River coal is superior to Pocahontas in smokeless qualities.
4. The number of miles that can be steamed with Bering River on one bunkering is much smaller than can be accomplished with Pocahontas—approximately one-half. That is to say, with Pocahontas coal the *Maryland* could steam from San Francisco to Yoka-

hama direct and arrive with approximately 300 tons in her bunkers, while with Bering River she could steam only as far as Honolulu and arrive with the same amount in her bunkers.

CONCLUSION.

Bering River run-of-mine coal is inferior to Pocahontas.

FORTY-EIGHT HOUR 10-KNOT TEST.

In view of the unexpected large coal consumption with Bering River coal during the other tests, no coal was available for this test. The absence of these data is not felt, however, in view of the data furnished during the other trials.

FINAL CONCLUSION FROM THE FOREGOING TESTS.

Bering River run-of-mine coal is unsuitable for naval use.

In order to test accurately the suitability of screened and washed Bering River coal, the coal to be tested at the Engineering Experiment Station, United States Naval Academy, Annapolis, Md., was screened and washed to represent the best grade that can be expected from the Bering River fields. The results of this test are noted in the next report.

SUMMARY OF RESULTS OF THE COMPARATIVE TEST OF WASHED AND SCREENED BERING RIVER COAL AND OF POCAHONTAS RUN-OF-MINE COAL AT THE ENGINEERING EXPERIMENT STATION, UNITED STATES NAVAL ACADEMY, ANNAPOLIS, MD.

By T. W. KINKAID.

UNITED STATES NAVAL ACADEMY,
ENGINEERING EXPERIMENT STATION,
Annapolis, Md., February 13, 1914.

To: Bureau of Steam Engineering.

Subject: Summary of results of evaporative test of Bering River, Alaska, coal.

Reference: (a) Bu. S. E. letter No. 117391-623-15, of February 11, 1914.

1. Complying with the bureau's instructions, there is submitted below a summary of the results of comparative tests of Pocahontas and Bering River, Alaska, coals.

2. The Bering River coal is part of a lot of 587 tons mined by the Alaskan coal expedition, and the Pocahontas coal is run-of-mine from Pocahontas No. 1 Mine, Tazewell County, Va. Representative samples of the two coals were sized to determine the proportion of lump and fine coal in each, with the following results:

Size of screenings.	Pocahontas.	Bering River.
	<i>Per cent.</i>	<i>Per cent.</i>
Lump over $\frac{1}{2}$ -inch mesh.....	32.56	25.37
Coal through $\frac{1}{2}$ -inch and over $\frac{1}{4}$ -inch mesh.....	11.15	11.95
Coal through $\frac{1}{4}$ -inch and over $\frac{1}{8}$ -inch mesh.....	13.21	17.24
Coal through $\frac{1}{8}$ -inch and over 4-inch mesh.....	31.06	20.62
Coal through 4-inch mesh and over 10-inch mesh.....	11.56	23.95
Slack through 10-inch mesh.....	.47	.87
Hand-picked slate.....		
Total.....	100.00	100.00

3. The Pocahontas coal is considerably more friable than Bering River, as 2.39 times as much of the former as of the latter will break to pass through 4-mesh when lumps of various sizes are dropped on a solid concrete floor from a height of 10 feet. The Bering River coal has a luster and hardness closely resembling that of anthracite, does not break readily, but shows a bright fracture when broken. The waste material is in the form of a carbonaceous shale of high specific gravity varying in appearance from the good coal in luster and shape of particle. The shale is a hard material which does not have as brilliant a luster as the coal and exists in the shape of flat fragments, whereas the good coal is irregular in size and shape. The Bering River coal as mined contains 14.06 per cent ash in dry coal and has a

heating value of 13,286 British thermal units per pound of dry coal. Pocahontas coal has 5.66 per cent ash in dry coal and a heating value of 14,786 British thermal units per pound of dry coal.

4. Hand-picked Bering River coal over seven-eighths inch screen equals in thermal quality average Pocahontas run-of-mine coal and can scarcely be differentiated from it chemically. Screened sizes of Bering River coal increase in ash content as the sizes of mesh through which the coal is handled is decreased. The sulphur content of Bering River coal, regardless of size or ash content, is uniformly as low as that of Pocahontas coal.

5. In order to produce a fuel which was approximately as good chemically as Pocahontas coal, the Bering River coal was cleaned in a coal washery plant designed and built at the experiment station. In the cleaning process there was entirely discarded the slack through 10-mesh, it forming over 20 per cent of the entire lot and containing 26.54 per cent ash in dry coal. The coal was separated into sizes and washed. The resulting washed coal, consisting of 67.6 per cent of the original weight after discarding slate refuse and high ash slack, contained 7.32 per cent ash in dry coal and had a heating value of 14,453 B. t. u. per pound. As only the best grade of coal was desired for test, there was a further rejection of washed screenings 4 to 10 mesh, and the coal as fired was a mixture of hand-picked lump over seven-eighths-inch screen, washed nut seven-eighths-inch to one-half inch, and washed pea coal one-half-inch to 4-mesh. This mixture showed on analysis ash in dry coal of 5.42 per cent and a heating value of 14,844 B. t. u. per pound. Thus with a loss of 49.6 per cent of original coal it was possible to prepare a mixture which had an ash content 0.24 per cent lower than Pocahontas coal and a heating value 0.39 per cent higher, with a reduction in ash content from an original of 14.06 per cent to 5.42 per cent.

6. The evaporative tests, each of 24 hours duration, were made on a Babcock and Wilcox marine boiler under the following general test conditions:

Number of furnace doors.....	3
Heating surface, square feet.....	2,161
Grate surface, square feet.....	58½
Steam pressure, pounds gauge.....	300
Draft at base of stack, inches of water.....	0.75
Feed temperature, °F.....	185
Firing interval for one door, minutes.....	5
Cleaning interval for one furnace, hours.....	12

7. Coal and water were accurately weighed and all necessary observations of pressure, temperature, and general weather conditions were taken. The condensed results of the evaporative tests are:

	Pocahontas.	Bering River.
Total water evaporated, pounds.....	322,831	241,791
Total coal consumed, pounds.....	35,740	27,160
Water per hour, pounds.....	13,451	10,075
Dry coal per hour, pounds.....	1,454	1,114
Water actually evaporated per pound dry coal, pounds.....	9.25	9.05
Equivalent evaporation per pound dry coal, pounds.....	10.04	9.77
Boiler efficiency, per cent.....	65.80	63.57
Boiler horsepower developed.....	422.9	315.5
Builder's rating.....	218.1	216.1
Per cent rating attained.....	198.7	146.1
Dry coal per square foot grate surface, pounds per hour.....	24.95	19.11
Equivalent evaporation per square foot heating surface, pounds per hour.....	6.75	5.04

8. The Bering River coal when first fired on a clean grate burns with a fierce fire and produces a high evaporation. Gradually, however, a dense clinker forms which fuses to the grate bars, filling the air spaces and preventing the entrance of sufficient air for combustion. During the first hour of the test the evaporation was 14,872 pounds of water and 1,814 pounds of coal were burned. In three hours the hourly evaporation had fallen to 10,731 pounds and the corresponding coal consumption was 1,263 pounds. From that time, although the greatest effort was made to break up this clinker by slicing through the fire door and driving a sharpened pricker bar between the grate bars from the ash pit below, the evaporation remained low. The minimum rate was 7,114 pounds per hour and the maximum 11,113, the corresponding coal consumption being 660 and 1,159 pounds. Not only at cleaning periods when the boiler pressure fell some 50 pounds, but frequently in between times it was impossible to maintain full boiler pressure. No coke is formed during combustion and very little ash falls through the grate on account of the clinker between grate bars. Smoke is much lighter than with Pocahontas coal, due in part to much lower rate of driving.

9. In spite of the care in preparation of the Alaskan coal for test, wherein the ash content was reduced to as low a figure as that found in Pocahontas coal, the test shows that the coal is entirely unsuited for use on standard Navy grate bars on account of—

- (a) Dense clinker formed on grate.
- (b) Reduction in boiler capacity from 195.7 to 146.1 per cent of rating.
- (c) Decrease in boiler efficiency of 2 per cent as against Pocahontas run-of-mine.
- (d) Forty-eight and six-tenths per cent loss in preparation.
- (e) A cost of approximately \$6.34 per ton cleaned coal at the point of preparation.
- (f) Increased labor of furnace cleaning beyond the endurance of the average fireman.

**REPORT IN DETAIL OF THE COMPARATIVE TEST OF WASHED
AND SCREENED BERING RIVER COAL AND OF POCAHONTAS
RUN-OF-MINE COAL AT THE ENGINEERING EXPERIMENT
STATION, UNITED STATES NAVAL ACADEMY, ANNAPOLIS,
MD.**

[First indorsement.]

UNITED STATES NAVAL ACADEMY,
Annapolis, Md., February 4, 1914.

From: Head of Naval Engineering Experiment Station.

To: Bureau of Steam Engineering.

Subject: Comparative evaporative test of Pocahontas and Bering River (Alaska) coal.

References: (a) Bu. S. E. letter 103463-623-15-F, of August 12, 1913;
(b) Department's letter 25320-77, of September 8, 1913; (c) Bu. S. E. letter 103463-623-15, of September 22, 1913.

Inclosure: (A) Report of test.

1. Forwarded, approved.

2. Mr. G. R. Delamater, referred to in paragraph 23 of the report, was detailed by the Bureau of Mines to cooperate with this station in regard to preparation of the Bering River coal for test. Mr. Delamater's report in regard to the washery operations has not yet been received. It will be forwarded later as a supplementary report.

T. W. KINKAID.

UNITED STATES NAVAL ACADEMY,
ENGINEERING EXPERIMENT STATION,
Annapolis, Md., February 2, 1914.

From: Loeb, Leo, mechanical engineer.

To: Head of Naval Engineering Experiment Station.

Subject: Comparative Evaporative Test of Pocahontas and Bering River (Alaska) Coal.

References: (a) Bu. S. E. letter 103463-623-15-F, of August 12, 1913; (b) Department's letter 25320-77, of September 8, 1913; (c) Bu. S. E. letter 103463-623-15, of September 22, 1913.

Inclosures: (A) Coal analyses of samples from screening tests; (B) Table I, drawing No. 483, summary of dry coal analyses of samples from screening tests; (C) float and sink tests, Bering River coal; (D) float and sink tests, Pocahontas coal; (E) photograph, Bering River coal as received; (F) photograph, Pocahontas coal as received; (G) photograph, screened Bering River coal; (H) photograph, shaking screen for sizing Bering River coal; (I) general layout of washery plant, drawing No. 484; (J) photograph of washery plant; (K) details of coal washery, drawing No. 485; (L)

coal analyses of samples from washery operations; (M) Table II, drawing No. 486, summary of dry coal analyses of samples from washery operations; (N) Table III, data and results of washery operations; (O) Table IV, data and results of evaporative tests; (P) coal, ash, clinker, and soot analyses from evaporative tests; (Q) photographs of stack during evaporative tests; (R) recording pressure gauge records; (S) recording feed thermometer records; (T) recording stack draft records.

1. In its letter, as above reference, the Bureau of Steam Engineering directed this station to make comparative evaporative tests under identical full-speed conditions of a representative Pocahontas run-of-mine coal and of coal mined by the Alaskan coal expedition in the Bering River field. Upon the arrival of the U. S. S. *Maryland* at Mare Island 50 tons of the Bering River coal were loaded in a closed car for shipment on August 21, 1913. The routing of the shipment was via Sunset & Gulf, rail to Galveston, boat to New York, and rail to Annapolis, where it arrived September 16, 1913. The coal was shipped in 415 bags of a total net weight of 98,000 pounds. About one-fourth of the bags was exposed to rain during the unloading period, but the remainder was not so exposed. The coal was stored under cover and retained in bags until screened.

2. The coal as mined was a mixture of coals from the Trout Creek workings of the Bering River district and is commercially designated as Bering River mine No. 4 and Bering River mine No. 5 (big vein). The tidewater outlet of this coal is Controller Bay. The total amount of fuel mined by the expedition was 587 tons, the major portion of which was used for steaming tests on the *Maryland*.

3. The Pocahontas coal used in the comparative test was in a car selected at random from the coal yard at Bluefields, Va., on August 16, 1913, and arrived at Annapolis August 25, 1913. The detailed description of the coal as given by the Bureau of Supplies and Accounts is—

(a) Name of mine: "Pocahontas Mine No. 1," otherwise known as "Baby Pocahontas Mine."

(b) Operating company: Pocahontas Consolidated Collieries Co. (Inc.)

(c) Location of mine: Pocahontas Field, Tazewell County, Va., near Pocahontas.

(d) Coal bed: "Pocahontas No. 3 vein."

(e) Preparation at mine: Straight run of mine.

(f) Date of shipment from mine: August 13, 1913.

(g) Gross tonnage: 45.1786.

(h) Price of coal: \$1.50 per ton (of 2,240 pounds) at the mine.

The coal was dry when received and was stored under cover until used. A week previous to the evaporative test the pile was wetted down to prevent too large a dust loss, as the coal was very dry.

4. On September 20, 1913, a joint inspection of the fuels was made by officers representing the Bureau of Steam Engineering, Bureau of Mines, and the Engineering Experiment Station, following which it was decided to select representative lots of the two coals for screening tests in order to determine the proportion of lump and fine coal of each variety and the character of the lump. Complying with instructions in paragraph 6 of reference (a) the first screening was performed through a wire-mesh screen made at the station, consisting of one-eighth-inch wires accurately spaced 1 inch on centers so that the width of the space was exactly seven-eighths

inch. Additional screens were made up from woven wire in store such that the mesh would be a gradual reduction from the largest of seven-eighths-inch mesh to the finest of 10 meshes per inch. The wire screens used had the following dimensions:

Commercial size.	Center to center of wires.	Diameter of wires.	Net width of spaces.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
$\frac{1}{2}$ -inch.....	1.000	0.128	0.872
$\frac{3}{4}$ -inch.....	.516	.045	.471
4-mesh.....	.255	.028	.237
10-mesh.....	.100	.040	.060

Any future reference to these screens will be to commercial size.

I. PRELIMINARY EXAMINATION OF COALS.

5. The preliminary examination of the two coals under test may be summarized under three headings:

- (i) Screening tests.
- (j) Float and sink tests by the Bureau of Mines.
- (k) Physical examination.

Wherever possible samples were selected for chemical analysis and forwarded to the Pittsburgh, Pa., laboratory of the Bureau of Mines. This bureau cheerfully and promptly proceeded with the large number of analyses required and rendered valuable assistance and advice in regard to such test operations as related strictly to coal mining and coal preparation.

6. The initial screening tests were made under the supervision of Mr. Chas. Enzian, mining engineer, Bureau of Mines, Wilkes-Barre, Pa. The procedure was to take about a ton of coal of each variety and screen through the seven-eighth inch screen. The coal remaining on top of the screen washand-picked for slate and separated into two lots, one of lumps larger than $3\frac{1}{4}$ -inch and the balance larger than seven-eighth inch. The coal making up the lump and that forming the screenings was quartered and finally reduced to pass a 4-mesh screen before being sealed in the standard 3-pound sample tins supplied by the Bureau of Mines. The Bering River coal remaining from the rejected quarters was then screened through the smaller meshes and samples taken in like manner. At a later date a sample of Pocahontas coal was screened through the entire series of screens as a direct comparison to the results from Bering River coal. The gross sample of Pocahontas coal originally selected was 2,009 $\frac{1}{2}$ pounds and the composition of the run-of-mine mixture was —

Size.	Weight.	Per cent.
	<i>Pounds.</i>	
Hand-picked slate on $\frac{1}{2}$ -inch.....	124	0.62
Lump larger than $3\frac{1}{4}$ -inch.....	450 $\frac{1}{2}$	22.42
Lump $\frac{1}{2}$ -inch to $3\frac{1}{4}$ -inch.....	428 $\frac{1}{2}$	21.32
Coal through $\frac{1}{2}$ -inch screen.....	1,112 $\frac{1}{2}$	55.64
Gross sample.....	2,009 $\frac{1}{2}$	100.00

7. A second and larger sample of 5,025 pounds was carried through the series of screens with the following results:

Size.	Weight.	Per cent.
	<i>Pounds.</i>	
Hand-picked slate on $\frac{1}{8}$ -inch.....	23 $\frac{1}{2}$	0.47
Lump larger than $\frac{3}{4}$ -inch.....	553	11.00
Lump $\frac{1}{2}$ -inch to $\frac{3}{4}$ -inch.....	1,083	21.56
Through $\frac{1}{2}$ -inch and over $\frac{1}{4}$ -inch.....	580 $\frac{1}{2}$	11.15
Through $\frac{1}{4}$ -inch and over 4-mesh.....	664	13.21
Through 4-mesh and over 10-mesh.....	1,560	31.05
Slack through 10-mesh.....	581	11.56
Gross sample.....	5,025	100.00

8. The proportions of Bering River coal, as given by a gross sample of 2,122 $\frac{1}{2}$ pounds, the contents of nine bags selected at random, were:

Kind of sample.	Weight (pounds).			
	On $\frac{1}{8}$ -inch screen.	On $\frac{1}{4}$ -inch screen.	On 4-mesh screen.	On 10-mesh screen.
Slate.....	18 $\frac{1}{2}$			
Lump over screen.....	538 $\frac{1}{2}$	251 $\frac{1}{2}$	335 $\frac{1}{2}$	358 $\frac{1}{2}$
Coal through screen.....	1,565 $\frac{1}{2}$	1,399 $\frac{1}{2}$	867	464 $\frac{1}{2}$
Gross sample.....	2,122 $\frac{1}{2}$	1,550 $\frac{1}{2}$	1,202 $\frac{1}{2}$	864

9. Reduced to percentage of original as received sample the results are:

Size.	Per cent.
Hand-picked slate on $\frac{1}{8}$ -inch.....	0.87
Lump over $\frac{1}{8}$ -inch.....	25.37
Through $\frac{1}{2}$ -inch and over $\frac{1}{4}$ -inch.....	11.95
Through $\frac{1}{4}$ -inch and over 4-mesh.....	17.34
Through 4-mesh and over 10-mesh.....	20.63
Slack through 10-mesh.....	23.95
Total.....	100.00

10. The analyses of the samples secured from the screening tests as reported by the Bureau of Mines are given in inclosure (A) and summarized on the dry basis in Table I, inclosure (B). The samples were prepared by Mr. Chas. Enzian, mining engineer. An inspection of these analyses indicates the following:

(l) Hand-picked Bering River coal over seven-eighth-inch screen equals in thermal quality average Pocahontas run of mine and can scarcely be differentiated from it chemically.

(m) Screened sizes of Bering River coal increase in ash content as the sizes of mesh through which the coal is handled is decreased.

(n) The ash and moisture free thermal value of the Bering River coal decreases with ash content.

(o) The sulphur content of Bering River coal regardless of ash content is uniformly as low as Pocahontas coal and is subject to slight change with ash content.

(p) The fusing temperature of the ash as determined in a reducing atmosphere in a molybdenum furnace shows no uniform variation with size or ash content for either of the coals examined, but the fusing temperature for Pocahontas coal is on the average 72° higher than that of Bering River. The lack of uniformity of these results leaves much to be desired in the determination of a factor which is supposed at least to be an index to the tendency to form clinker.

(q) The ash content is lower and the heating value of the Pocahontas coal is higher for small sizes than for large sizes. This is due to the fact that the fines are derived from the purer coal, which is very friable; and the slate and shale, which is somewhat harder, tends to remain as separate particles and as a lump binder with the larger sizes. The free or extraneous ash in the Bering River coal is free from the coal and in its broken condition tends to be associated with the fines rather than with the lump which can more easily be hand-picked at the mine.

(r) The ash and moisture free heating values of the Pocahontas coal for all sizes are very uniform and slightly higher than that for Bering River coal.

(s) The specific gravity of Bering River coal is from 0.12 to 0.16 higher than that of Pocahontas.

11. The tabulation of coal analyses indicated clearly that it was necessary to wash or otherwise clean all sizes of Bering River coal smaller than seven-eighths-inch mesh, to make the coal approach in quality best run-of-mine Pocahontas. In order to determine the betterment to be expected from washing, a sample of 490 pounds was taken by opening a number of bags and taking from each a shovelful of coal. The sample was quartered without crushing and the rejected quarters furnished the sample for the first analysis of Table I, "As received not cleaned or screened," Bureau of Mines No. 17736. The quarters retained were placed in a tight can holding 108 pounds and forwarded to Pittsburgh October 3, 1913. The results of the float and sink tests are given in report "Float and Sink Tests, Bering River Coal," from Geo. S. Rice, chief mining engineer to the Director, Bureau of Mines, under date of October 11, 1913, appended to this report as inclosure (C).

12. The procedure in the preparation of the coal for float and sink test is outlined in the memorandum of Mr. Rice and that of Mr. A. C. Fieldner, chief chemist. The method followed in making the float and sink tests proper consists in preparing zinc chloride solutions of densities 1.35, 1.45, 1.55, and 1.65. The coal to be tested, after being properly sized, is immersed in the solution of lowest specific gravity, thoroughly stirred to insure intimate mixture of the coal and solution. The floating mass of less specific gravity than the solution is skimmed off, washed, and weighed, the solution then poured off and the sink of greater specific gravity than the solution is collected, washed, and weighed. The sink from the first solution becomes the gross sample for the second solution, the float and sink fractions again collected, the sink becoming the gross sample for the third solution—and so on through the entire series. A sample for ash determination is taken from each fraction.

13. The results of the float and sink test are more favorable than is to be expected from a representative sample of Bering River coal, since the ash in raw coal, dry basis, is but 10.49 per cent, whereas the

other quarter of the same lot of coal, sample 17736, gave 14.06 per cent ash in dry coal and all other determinations range from 14 to 15 per cent. This variation of $3\frac{1}{2}$ per cent can not be explained, as the discrepancy runs through all sizes, other than to the fact that the sample weight, gross 490 pounds, was not large enough to be thoroughly representative of a coal representing a mixture of fuels from several workings.

14. The results of the float and sink tests show that with fractions 1 inch to one-half inch, one-half inch to one-fourth inch, one-fourth inch to 10-mesh, and 10-mesh to 60-mesh, containing, respectively, 6.68, 9.25, 13.14, and 20.25 per cent ash in dry coal and being 44.6, 17.0, 19.2, and 15.0 per cent of original coal, it is possible to separate into float on 1.65 specific gravity coals having 3.40, 3.49, 4.13, and 4.74 per cent ash in dry coal and a sink comprising refuse showing 66.39, 74.61, 73.91, and 70.07 per cent ash in dry coal, the sink forming 5.21, 8.11, 12.92, and 23.74 per cent of the respective fractions, not including 4.2 per cent of original coal finer than 60-mesh and containing 25.01 per cent ash in dry coal. The only departure from the comments and conclusions of Mr. Rice is first at the end of paragraph 5 where he states "but it is probable that the coal can be washed so that it will contain less than 5 per cent and possibly 4 per cent ash." Since one fraction runs as high as 4.74 per cent ash in dry coal for float on 1.65 specific gravity, it would be considerably more conservative on account of a reasonable limit to the water used in washing and the rate of jigging to fix the limits of ash in dry coal of washed coal between 6 and 8 per cent. Secondly, Mr. Rice states that "there would be little difficulty in making the separation with a good coal-washing system, at least for coal over 60-mesh in size. As only 4.2 per cent passed through 60-mesh this might be thrown away without the loss being serious, since it would represent only a small fraction of the total." As a matter of fact slack finer than 10-mesh representing 19.2 per cent of the total is so high in ash as to be washed with the greatest difficulty and is entirely unsuited to naval use.

15. To establish a basis of comparison between the two coals as shown by float and sink tests with solutions of the same density as that used with the Bering River coal, a set of samples of Pocahontas coals from the quarters retained after screening tests was forwarded to the Bureau of Mines, Pittsburgh, Pa., on October 25, 1913. The samples were:

- 2 bags, weight 76 pounds, lump over seven-eighth inch screen.
- 1 bag, weight 39 pounds, through seven-eighth inch and over one-half inch screen.
- 1 bag, weight 21 pounds, through one-half inch and over 4-mesh.
- 1 bag, weight 21 pounds, through 4-mesh and over 10-mesh.
- 2 cans, weight 6 pounds, screenings through 10-mesh.

16. The results of the float and sink test are contained in the data "Chemical Laboratory Report," inclosure (D). These tests again indicate the superior quality of the fines from Pocahontas coal over the coarser samples. Ranging in size from lump over seven-eighth inch screen to slack through 10-mesh on 60-mesh the fractions show 98 per cent float on 1.65 specific gravity with dry-ash contents of 5.16, 5.12, 4.15, 2.87, and 2.30 with 2 per cent sink, containing 65.75, 63.98, 67.86, 72.31, and 71.61 per cent ash in dry coal. The original ash dry-coal analyses of the portions showed 6.19, 6.60, 5.39, 4.23, and

4.47 per cent, which form close agreements with the corresponding samples in Table I.

17. The appearance of the two coals as received is shown in photographs, inclosures (E) and (F), and in inclosure (G) is indicated the separation of the Bering River coal into lump over seven-eighths inch, screenings through seven-eighths inch, and hand-picked slate, as well as the screen used. The Bering River coal has a luster and hardness closely resembling that of anthracite, does not break up readily, but shows a bright fracture when broken. The clean break closely resembles the reflecting surface of hard pitch and has no regular cleavage. The waste material can be readily distinguished from the good coal in luster, color, and shape of fragment. It is in the form of a carbonaceous shale of much higher specific gravity than the coal, the surface is dull, the color varies from dirty gray to dull black, and it always exists in the shape of flat lenticular fragments, whereas the good coal is irregular in size and shape. The specific gravity of the good coal as shown by displacement is 1.35, while that of the slate is 2.53.

18. The Pocahontas coal is characteristic of that field, dull, friable, containing in the run of mine about 35 per cent lump larger than seven-eighths inch. The fracture is along regular lines and the particles resulting are nearly cubical.

19. In order to determine the relative friability of the two coals, 10 lumps of each variety were selected for a drop test. The lumps which varied in size from 2.10 pounds to 27.71 pounds and measuring from 3 by 4 by 6 inches to 8 by 13 by 15 inches were dropped once from a platform 9 feet 10 inches high upon a concrete floor below. The fragments were separated into three sizes, viz, lump larger than $3\frac{1}{4}$ inches, lump $3\frac{1}{4}$ inches and over 4-mesh, and fines through 4-mesh. The results of these tests, which indicate clearly the ability of the two fuels to withstand breakage of lump upon handling, are as follows:

	Bering River.	Pocahontas.
Number of lumps in original sample.....	10	10
Number of broken lumps larger than $3\frac{1}{4}$ inches.....	28	20
Lump larger than $3\frac{1}{4}$ inches..... pounds.....	53.18	30.46
Lump through $3\frac{1}{4}$ inches and over 4-mesh..... do.....	47.46	41.57
Screenings through 4-mesh..... do.....	6.19	13.04
Weight of original sample..... do.....	108.83	94.14
Lump larger than $3\frac{1}{4}$ inches..... per cent.....	49.76	41.91
Lump through $3\frac{1}{4}$ inches and over 4-mesh..... do.....	44.41	44.16
Screenings through 4-mesh..... do.....	5.83	13.93

The Pocahontas shows 2.39 times as much fine coal through 4-mesh as does the Bering River.

II. SCREENING PRELIMINARY TO WASHING.

20. The float and sink tests having shown the possibility of a great reduction in ash content by cleaning, it was at once decided to prepare the coal for evaporative test by a wet process, which, following the washery practice in the anthracite fields, required the separation of the coal into uniform sizes. The screens available were seven-eighths inch, one-half inch, 4-mesh, and 10-mesh, and from these a mechanically operated shaking screen was constructed and erected

as shown in photograph, inclosure (H). A variable-speed motor A drives a pulley B, on whose shaft is secured the disk crank C. The stroke may be from 4 to 10 inches, depending on which position the connecting rod D is secured. Coal is fed from the platform to the seven-eighths-inch screen E, which is 3 feet long, and the lump is delivered into the bin F in the foreground. The coal through seven-eighths-inch screen drops successively to the one-half-inch and 4-mesh screens G and H. These screens are 6 feet long and delivery is through chutes I. The 10-mesh screen L is 10 feet long, the slack falling through to a bin below and the screenings being delivered to the left. The screens are hung from a framework by one-fourth-inch cable to permit of adjustments of slope. The best pitch for efficient separation was found to be three-fourths of an inch per foot and the corresponding speed of the shaker was 110 revolutions per minute. The screening was done on October 2, 3, and 4, 1913, at the rate of about 4 tons per hour.

21. The coal weighed after screening showed the following proportions:

	Pounds.	Per cent.
Lump over $\frac{1}{2}$ inch.....	19,577	25.38
Coal through $\frac{1}{2}$ inch and over $\frac{1}{4}$ inch.....	11,699	15.16
Coal through $\frac{1}{4}$ inch and over 4-mesh.....	14,305	18.69
Coal through 4-mesh and over 10-mesh.....	15,819	20.51
Screenings through 10-mesh.....	15,682	20.38
Total.....	77,132	100.00

These results for the entire tonnage are in very close agreement with the 1-ton screening test, paragraph 9 which showed percentages of 25.59, 12.06, 17.39, 20.80, and 24.16 when the slate is eliminated.

III. WASHING OPERATIONS—DESCRIPTION OF PLANT.

22. Through the efforts of Mr. Chas. Enzian of the Bureau of Mines the station was offered the use of a 6-tons per hour basket type of jig manufactured by the Wilmot Engineering Co., of Hazleton, Pa., without charge except for the transportation of the machinery and the services of a competent man to oversee the erection and operation. Upon investigation these charges were found to be a large part of the quoted price of the machine, so that on November 7, 1913, a requisition for the purchase of a Wilmot Washer was made.

23. On November 25, 1913, the station was visited by Mr. G. R. Delamater, fuel engineer, formerly engineer in charge of the Denver washery plant of the Bureau of Mines. His report after an examination of the bins of screened Bering River coal was that a basket type of washery was entirely unsuited to coal of this character and containing the quality of slate associated therewith. Furthermore a jig with a capacity of 6 tons per hour would give a rate of washing too high for the small quantities of each size on hand (see paragraph 21), as too great a proportion of the fuel would be used in forming the bed in the basket and the washing would be so rapid that there would not be an opportunity of checking up the efficiency of the operation by the usual float and sink tests. Mr. Delamater thereupon prepared

sketches of a plunger type of jig with a capacity of 2 tons per hour, and from these sketches detailed drawings were made and a washery plant constructed at the station according to those plans after the requisition for the Wilmot jig had been canceled. The construction was begun on November 26, 1913, and completed on December 11, 1913, with the following costs:

Planning, estimating, and design.....	\$50. 61
Material.....	28. 05
Labor.....	186. 59
Total.....	265. 25

24. The general layout of the washery plant is shown in drawing No. 484, and photograph, inclosure (J), and the details of the washing tank in drawing No. 485. When coal containing a considerable quantity of free slate or shale is placed in a vessel containing a solution of specific gravity higher than that of the particles of good coal, the slate will sink to the bottom and the combustible portions will remain on top. The imitation of this process on a large scale constitutes the working of an efficient washery. The principle utilized in the plunger type of jig is that a bed of conglomerate material will separate into layers of the same density when water is forced upward through the bed, the heavier particles seeking the bottom. The raw coal representing the conglomerate is fed onto a screen through which the water passes; the slate works its way to the bottom and is removed and the cleaned coal is carried off at the top with the overflow water. In addition soluble ingredients such as certain forms of organic sulphur often associated with coal are carried away, and clay and soft shale are broken up and washed out.

25. Referring to the general arrangement: A variable speed motor A drives through a jack shaft B the washer shaft C. The plunger P is driven through a connecting rod and a crank with variable throw and by its motion forces the water from the supply tank into the washing tank T and upward through the 16-mesh screen F. Coal is fed from the hopper D to the gate E, which regulates the feed to the screen. The slate and heavy materials that separate out pass under the gate G to the refuse bin M, from which the refuse is periodically drawn through the 4-inch quick-opening valve N, when the float indicator V rises to a predetermined point. The washed coal is carried by the overflow water down the chute H and onto the 10-mesh screen J. The water separates and flows away in the trench and the washed coal is discharged into barrows. The screen was driven by the same mechanism as was used in the sizing operations as described in paragraph 20. The hutch refuse which sifts through the 16-mesh screen into the tank may be drawn at the plug U. The details of the washery construction including connecting rod, plunger, and the arrangement for varying the length of plunger stroke, are shown in drawing No. 485. The hopper, refuse bin, and washery chamber are built up about a sheet-iron tank such as is used in weighing liquids. The plunger fits but loosely in its chamber, as the best results are obtained not by pumping the water through but by producing a tremor which agitates the bed to produce the desired separation. The usual practice in commercial operations is to use the water over again up to the point

where it becomes too highly charged with sludge, but in this test fresh water was used throughout, in order to obviate any delay which might be caused in constructing a suction tank, and the necessary circulating system. One feature in the design is subject to considerable improvement; that is, the method of removing the refuse. Before drawing down the refuse, the raw coal supply is shut off and after the flow of washed coal over the chute H ceases, the 4-inch valve is opened to draw the refuse down to a level indicated by the pointer. In so doing a quantity of the full bed is drawn under the gate G, as there are always pieces of coal below it to prevent proper seating. This results in somewhat more good coal going to the refuse pile than would be the case if the refuse were elevated and removed as fast as it worked past the refuse gate.

IV. OPERATION OF WASHERY.

26. The coal washing began on December 11, 1913, with the largest screened size seven-eighths to one-half inch, the washery being operated for the first day by Mr. G. R. Delamater. The raw coal to the feed hopper was sampled and weighed, the washed coal and refuse resulting therefrom was weighed and sampled, and the sizes of washed coal kept separate as before washing. One observer took samples for float and sink tests, which were made immediately, in order to serve as a guide to the operation of the jig. All float and sink tests were made with a zinc chloride solution of 1.65 specific gravity. A sample of about 5 pounds was selected for trial, emptied into a dish pan containing the solution, which was kept up to desired strength by the addition of fresh chemical as required. The float was skimmed off into a 40-mesh sieve and washed, the solution poured into another pan, and the sink fraction placed into a second sieve, where it was washed to rid it of accumulated zinc chloride. After the two fractions had drained for a few minutes, they were weighed and placed in cans to serve as samples for chemical analysis. The order of sampling was (1) raw coal, (2) washed coal, (3) refuse, (4) washed coal, and repeat, thus giving twice as many washed-coal samples as either raw coal or refuse. At the conclusion of the washing tests additional float and sink tests were made on a composite sample from the large can retained for chemical analyses. In the calculations the float and sink from the composite was given equal weight with the average of the separate determinations.

27. The experimental run of the washery was made with a length of stroke of 1 inch and a speed of 102 revolutions per minute. This did not result in sufficient agitation of the water to produce economical washing, so the length of stroke was increased to 2 inches and the speed kept practically constant. Trials with the smaller sizes showed that even better results were attained by increasing the speed to 128 revolutions per minute. The setting of the gate controlling the raw-coal feed was such as to give a slow feed of washed coal over the chute, and the height of the refuse gate was varied according to the size of coal being washed, so that the heavier slate particles would work under the gate without carrying over too great a proportion of good coal. Occasional samples drawn by hand from the bottom of the fuel bed on top of the 16-mesh screens served as an index to the proper setting of this gate, as too small a vent caused the refuse to accumulate on

the screen. The refuse was drawn as often as the float indicator V rose in its guide to a fixed point which marked the approximate filling of the refuse bin. No attempt was made to measure water consumed.

28. The float and sink tests of the washed coal, size one-half inch to 4-mesh, indicated that the washing of some of the coal had not been carried to the point of best ash reduction. Hence a portion of this coal was rewashed with considerable improvement. The refuse from the two larger sizes of coal, seven-eighths inch to one-half inch and one-half inch to 4-mesh, was rewashed and resulted in the salvage of about 50 per cent thereof of coal of good quality.

29. The results of the complete washery operations are given in Table III, Inclosure (N). The results indicate that with a small plant the three sizes washed, seven-eighths inch to one-half inch, one-half inch to 4-mesh and 4-10 mesh, may be reduced from dry ash contents in raw coal of 10.81, 12.88, and 18.43 per cent to washed coal with dry ash contents of 5.78, 6.79, and 11.66 per cent with the loss of refuse and good coal combined of 14.32, 27.41, and 19.80 per cent, giving ash reductions of 46.50, 47.28, and 36.72 per cent from the original. The excess loss in the middle size is due to the rewashing, so that with care the waste might have been 20 per cent as a maximum. Thus the result of hand cleaning, screening, and washing 76,634 pounds of coal, after deducting loss for sampling from the figures as given in paragraph 21, will produce the following:

Size.	Raw coal.	Dry cleaned coal.	Ash in cleaned coal.	B. t. u. per pound dry coal.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Per cent.</i>	
Lump over $\frac{1}{2}$ inch.....	19,577	19,420	5.61	14,726
Coal through $\frac{1}{2}$ inch and over $\frac{1}{4}$ inch.....	11,559	9,791	5.78	14,736
Coal through $\frac{1}{4}$ inch and over 4-mesh.....	14,170	10,183	6.79	14,657
Coal through 4-mesh and over 10-mesh.....	15,646	12,413	11.66	13,703
Dust through 10-mesh.....	15,682			
Total.....	76,634	51,807		

The combination of the several sizes, discarding the dust, which with 26.54 per cent ash in dry coal was pronounced unfit for use, would produce the following:

Size.	Total weight, dry coal.	Per cent of original weight.	Ash in dry coal.	B. t. u. per pound dry coal.
			<i>Per cent.</i>	
Over $\frac{1}{2}$ inch.....	19,420	25.34	5.61	14,726
Over $\frac{1}{4}$ inch.....	29,211	38.12	5.67	14,736
Over 4-mesh.....	39,394	51.41	5.96	14,690
Over 10-mesh.....	51,807	67.60	7.33	14,453

Based on quoted figures of \$3 per ton for mining and \$0.50 per ton for washing, the following would be the actual cost per ton of producing dry coal of the several sizes and qualities:

Lump over $\frac{1}{2}$ -inch.....	\$12.34
Over $\frac{1}{4}$ -inch.....	8.37
Over 4-mesh.....	6.34
Over 10-mesh.....	4.96

30. It is noticeable in the summary of chemical analyses, Table II, that there is no appreciable reduction in the already low sulphur content, indicating the sulphur in this coal is entirely associated with the coal material and is not present in sulphur balls or pyrites. The refuse from the washery when wet is even more readily distinguishable from the good coal by the features mentioned in paragraph 17. The average fusing temperature of the float on 1.65 specific gravity, raw coal and washed coal are 2,459°, 2,361°, and 2,406° F., indicating that there would be only slightly less tendency for the washed coal to produce clinker than the raw coal, and that washing produces coal with a fusing temperature within approximately 40° of the raw coal and within 50° of the float on 1.65 specific gravity. The hutch refuse, of which 90 pounds were removed from the bottom of the washery tank, is the fine material which works its way through the bed screen. It is principally waste material, containing 30.59 per cent ash in dry coal. On an ash and moisture free basis the volatile matter is slightly lower in the float on 1.65 specific gravity than in the raw or washed coal, but the average carbon-hydrogen ratio for all sizes and treatments is almost exactly 20. The close agreement between the per cent of washed coal and refuse by weight and by analysis indicates that the utmost care was observed in sampling and analysis, but failure to agree with earlier analyses must be due to actual variations in quality, as the coal came from a number of workings. The general effect of washing and combining sizes over 10-mesh may be summarized:

(t) Loss in weight of raw coal as refuse, per cent.....	32.40
(u) Reduction in dry ash content, per cent.....	6.74
(v) Increase in heating value, B. t. u. per pound dry coal.....	1,167
(w) Increase in heating value, B. t. u. per pound coal ash and moisture free.....	93
(z) Increase in fusing temperature of ash, °F.....	45
(y) Sulphur content.....	Unchanged.
(z) Carbon-hydrogen ratio.....	Unchanged.
(sz) Proportion of volatile matter.....	Unchanged.

31. Following instructions received from the bureau in its letter No. 112765-623-15 of December 15, 1913, such sizes were mixed as would produce a fuel of at most 6.8 per cent ash; there was rejected the washed coal size 4 to 10 mesh and a mixture made of screened, hand-picked lump over seven-eighths inch, washed nut seven-eighths inch to one-half inch, and washed pea coal one-half inch to 4 mesh, and it was with this mixture, together with about 1,800 pounds of rewash refuse, that the evaporative tests were made.

V. EVAPORATIVE TESTS:

32. The evaporative tests were made on succeeding days, using first the Pocahontas run of mine coal and then the mixed Bering River coal. The duration of each test was exactly 24 hours, and all conditions within the control of the operating force were kept exactly the same. The first run was begun December 16, 1913, at 12 noon, and concluded December 17, 1913. The Bering River test began at 8 p. m. of the same day, the slight delay in starting being due to time necessary to repair certain leaks that appeared after the boiler was cool.

33. The evaporative power of the two fuels was determined by weighing the coal as fired and the water fed to a marine water-tube boiler. A portion of the steam generated was utilized to operate test and station auxiliaries, but a large portion thereof was condensed and weighed back to the hot well, whence the feed pump took its suction. Steam pressure was maintained constant at 300 pounds gauge by varying the amount of steam bled to the condenser.

34. The boiler with which the tests were conducted is of the Babcock & Wilcox marine type, with the following principal dimensions:

Diameter of steam drum, 31½ inches.
Length of steam drum, 9 feet 11½ inches.
Number of 4-inch tubes, 16.
Number of 2-inch tubes, 407.
Thickness of 4-inch tubes, B. W. G. No. 6.
Thickness of 2-inch tubes, B. W. G. No. 8.
Length of 4-inch tubes, 7 feet 6 inches.
Length of 2-inch tubes, 403 at 9 feet, 4 at 8 feet 6 inches.
Furnace length, 7 feet.
Furnace width, 8 feet 4 inches.
Height at front, 25 inches.
Height at rear, 41 inches.
Length of grate, 7 feet.
Width of grate, 8 feet 4 inches.
Area of grate surface, 58½ square feet.
Area of heating surface, 2,161 square feet.
Ratio—heating surface: Grate surface, 37.1.
Per cent water heating surface, 100.
Per cent superheating surface, 0.
Kind of grate bars, Navy standard, single, cast iron.
Width of air spaces, ½ by 32 inches.
Total area of air spaces, 24.5 square feet.
Ratio—air space: Grate area, 0.42.
Volume of furnace, 160 cubic feet.
Ratio—furnace volume: Grate area, 2.74.
Area of smoke pipe, 8.72 square feet.
Height of smoke pipe above grate, 68 feet.
Ratio—grate area: Smoke pipe area, 6.69.
Water space, 117 cubic feet.
Steam space, 24 cubic feet.
Weight of water in boiler at 120° F., 7,250 pounds.
Draft by steam jet in stack.
Feed heater, Blake vertical.
Feed pump, Boston Navy Yard design.
Dimensions of cylinders, 16 by 10 by 12 inches.

35. The coal was wheeled from the bin to the boiler room in barrows each holding about 300 pounds of coal. A part of a shovel full was selected at random to give correct proportion of lump and fine coal, stowed in a can with close-fitting top, and the barrow weighed on platform scales to the nearest one-half pound. After dumping the coal upon the fireroom floor the empty barrow was weighed. At the end of every hour during the run, the coal upon the floor was weighed back to obtain the hourly totals of coal fired.

36. The ash pit was cleaned at the end of each hour and the ash collected was weighed and sampled. The ashes were not wetted down before weighing, though enough water was put into the ash pit to keep the bottom from blistering. All water to the pit was metered. The clinkers removed from the furnace were wetted down enough to be handled comfortably, weighed, and sampled. At the conclusion of the run the clinker adhering to the bridge wall and the soot accu-

mulating on tubes and baffles was removed, weighed, and sampled. All samples were crushed and quartered, reduced to 3-pound can size and forwarded to the Bureau of Mines, Pittsburgh, Pa., for analysis.

37. The feed pump drew its suction from a hot well from which all other pumps were blanked off, and the water to the hot well was weighed in 2,000-pound tanks mounted above. The steam generated by the boiler was condensed and pumped to these tanks and make-up feed was drawn from a reserve supply as required and weighed in tanks of 400 pounds net capacity. The hot well is a concrete tank with a level correction of 410 pounds per inch of height, and the hourly weights of water fed were corrected according to the variation as shown by a float on the tank.

38. The barometer reading to the nearest one-hundredth inch was recorded hourly, the temperature of the column being noted in order to reduce the reading to 32° F. The steam pressure at the boiler was taken to the nearest one-half pound per square inch by an accurate 1-pound interval test gauge attached to the safety valve nozzle. The pressure within the calorimeter was taken by a gauge which could be read to one-tenth of a pound. The draft in furnace and at base of stack were measured by inclined glass tube gauges graduated to read one-hundredth inches of water. Recording gauges were also coupled at the same points.

39. Mercury-in-glass thermometers were employed to obtain temperatures of external air, fireroom, feed water and steam in the steam line and in the calorimeter. The two latter had attached stem thermometers to correct for the stem exposure. Thermocouples were inserted in the back of the furnace and at the base of the stack to obtain the temperatures of the gases of combustion at those points. The latter was also measured by a high-reading nitrogen-filled mercury-in-glass thermometer suitably baffled to prevent radiation to adjacent metal surfaces.

40. The wind direction and velocity were shown by a wind vane and a wind gauge, respectively. To obtain the humidity of the atmosphere readings were taken of a dew-point hygrometer and a wet-bulb thermometer. A plentiful circulation of air past the wet bulb was maintained by an electric fan.

41. A sampling tube was inserted in a vertical portion of the steam pipe about 2 feet from the stop valve attached directly to a nozzle on the boiler drum. A throttling calorimeter with the necessary pressure gauge and thermometers was attached thereto. The smoke density was observed by comparisons during daylight with a Ringelmann's smoke chart obtained from the Bureau of Mines.

42. Samples of the flue gases were taken from the first pass of the gases across the tubes and from the base of the stack. To obtain the former, a one-half inch wrought-iron pipe with one end capped and containing 10 one-sixteenth inch holes was inserted into the lowest peephole of the aft-side cleaning door and extended nearly to the far side of the boiler. The stack sample was obtained through a spider consisting of a cast-iron body and six legs of one-half inch wrought-iron pipe with capped ends and a narrow slit along the under side of each. Flow of gases to the sample containers was produced by a steam ejector. The actual sample collected by mercury displacement in a 250 c. c. holder was taken from the stream of gas each half hour,

the flow of mercury being hand adjusted to fill the container in this period of time.

43. Before the test the boiler was carefully cleaned of mud and soot. No leaks were apparent under a water pressure of 450 pounds. At the conclusion of the first test—that on Pocahontas coal—a leak was noted at the lowest nipple on right front header. All the water was drained out of the boiler and this nipple rolled in, after which the boiler was filled with hot water and the fires lighted off for the second test.

44. The duration of each test was 24 hours, and the detail of firemen, water tenders, and observers was the same for each test, so that item was eliminated as far as possible. The fires were built up and after the boiler had begun to steam the draft was put on and full load carried. After an hour or more, when the setting had attained a uniform temperature, the test proper was begun by carefully leveling off all fires, firing lightly for 10 or 20 minutes to maintain this level, and observing as accurately as is possible on an incandescent bed the thickness of the fires at the signal of the next succeeding hour. This marked the exact beginning of the test, and from this time on all observations were taken at 15-minute intervals, except weights of water and coal, as before noted. Twenty-three hours thereafter such furnaces as required were cleaned and the fires gradually burned down to the level of the preceding day, allowing, again, about 20 minutes before the final signal for a period of alternate leveling and light firing to reproduce conditions at the beginning of the test. By this means it was possible to reduce the uncertainty of difference in height of fires at beginning and end of test to 2 inches or less, which, with a grate area of $58\frac{1}{2}$ square feet, makes the maximum possible error in coal weights 300 pounds, about 1 per cent of the total.

45. A firing interval of five minutes between the times of coaling any one of the three furnace doors was selected. A time firing device, consisting of a variable speed motor, geared down to drive an interrupter disk with one, two, and three contacts at a speed of one revolution in five minutes, was used. The interrupter was in circuit with a flash lamp mounted within view of the firemen, and the number of flashes as produced by the interrupter closing the circuit for one, two, or three short intervals indicated the door to be coaled. The coal was spread over the fuel bed, and after coaling any one door the fire in the door next to be coaled was leveled. The slice and pricker bars were used only when necessary to clear the grates if the ash pit became dark, no breaking up of fires being allowed. The thickness of fires varied slightly, as it was desired to maintain a flue gas analysis of 12 per cent CO_2 while not exceeding 1 per cent CO , and the fires were accordingly adjusted to obtain these figures. The fire in each door was cleaned once in 12 hours.

46. In addition to the quantities regulated as explained above, the draft at the base of the stack was maintained at three-fourths inch of water by hand adjustment of the steam jet in the stack; the feed temperature was regulated from 180° to 190°F. ; the steam pressure was kept at 300 pounds per square inch by bleeding to the condenser; the water level in the boiler was kept within 2 inches of the bottom of the gauge glass; and the water level in the hot well was

high enough that the suction to the feed pump was fully covered at all times. All instruments were carefully calibrated.

VI. RESULTS OF EVAPORATIVE TESTS.

47. The general results of the evaporative tests are given in Table IV, inclosure (O), the analyses of samples of coal, ash, clinker and soot in Bureau of Mines laboratory reports, inclosure (P), and the records of boiler pressure, feed temperature, and stack draft in reproductions, inclosures (R), (S), and (T). The photographs in inclosures (Q-1) and (Q-2) show the density of the smoke at the stack in the foreground between coaling periods and when coaling furnaces.

48. The Pocahontas coal burns readily with little clinker and clean ash, yielding with a 7.4-inch fire stack gases with 12.74 per cent CO₂ and 1.12 per cent CO. The clinker is readily broken up and does not adhere to the grate bars, so that no difficulty was encountered in maintaining full boiler pressure and obtaining the average rate of evaporation even during the period when the fires were burning down preliminary to cleaning. By reference to the pressure-gauge records, in which the cleaning operations are indicated by "C. F.," followed by the number of the fire door cleaned, it is noted that the only time that there was a noticeable drop in pressure was at 10.10 p. m., when the pressure fell for an instant to 235 pounds, but quickly returned to normal. The minimum evaporation for any one hour was 12,063 pounds of water, whereas the maximum was 14,752 pounds.

49. The Bering River coal when first fired on a clean grate burns with a fierce fire and produces a high evaporation. Gradually, however, a dense clinker forms which fuses to the grate bars, filling the air spaces and preventing the entrance of sufficient air for combustion. During the first hour the evaporation was 14,872 pounds of water and 1,814 pounds of coal were burned. In three hours the hourly evaporation had fallen to 10,731 pounds and the corresponding coal consumption was 1,263 pounds. From that time, although the greatest effort was made to break up this clinker by slicing through the fire door and driving a sharpened pricker bar between the grate bars from the ash pit below, the evaporation remained low. The minimum rate was 7,114 pounds per hour and the maximum 11,113, the corresponding coal consumption being 660 pounds and 1,159 pounds. Not only during cleaning periods, but frequently between times, it was impossible to maintain boiler pressure with the bleeder closed and with the boiler generating only steam required for auxiliaries and station turbo-electric unit on lighting load.

50. Following a cleaning period the ash pit below the grate cleaned remains bright for about 20 minutes, during which time some of the ashes formed drop through. Thereafter as the clinker again fuses in a mass over the grate and between the air spaces, the ash is retained in the furnace until the next cleaning and the furnace draft is so reduced as to further reduce the rate of combustion. Had it not been for the fairly high rate of evaporation during the first three hours, when all furnaces were bright and clean, the hourly evaporation would have been less than 10,000 pounds.

51. The following notes are transcribed from records made during the test:

During the preliminary test (7 to 8 p. m., Dec. 17, 1913) considerable ash dropped through the grate. Fire is burning fiercely. As coal burns down clinker formed on

grate and prevented further dropping. Firemen can not break clinker, as all is fused into one mass. Grates getting black at 9.30 p. m. Fire is about 5 inches thick. First cleaning at 10.10 p. m. A thin bed of clinker is tightly fused to bars and spaces between. Ash pit under furnace being cleaned is black. Pricker bar used to open spaces from below. Time of cleaning, 10 minutes; steam pressure dropped to 255 pounds.

And further, on December 18:

Cleaning middle door at 6.10 a. m. This fire has gone 11 hours without cleaning. Two inches of hard clinker is on grates. Pressure dropped to 228 pounds. Time of cleaning, 10 minutes; grate and pit fairly bright after cleaning.

52. No coke is formed during combustion, each lump appearing to burn as a unit instead of uniting with adjacent ones to form a coke mass after the distillation of gases. Flue gas analysis with 7.29-inch fires shows 10.97 per cent CO, and 0.53 per cent CO. By reference to inclosures Q1 and Q2 it is seen that smoke is considerably lighter with Bering River than with Pocahontas. The average by the Ringelmann chart is 59.4 per cent for Pocahontas and 27.4 per cent for Bering River. The difference is in part due to much lower rate of driving. The logs indicated the use of the slice and pricker bars 65 times during the Pocahontas trial and 153 times during the test of Bering River coal. This is in addition to fire cleaning.

VII. SUMMARY.

53. The main points which stand out from a comparison of the results in Table IV are as follows: The general conditions of temperatures and pressures were very constant for both tests with the exception of furnace draft, furnace and stack temperatures. The drop through the fuel bed was higher with the Bering River coal than with Pocahontas, since the accumulation of clinker and ash produced a greater resistance. On account of more rapid combustion and less air dilution the furnace and stack temperatures were higher for Pocahontas coal. With 0.75 inch draft at the base of the stack, a combustion of 34,893 pounds of dry Pocahontas coal on a 58½ square foot grate in 24 hours was obtained without difficulty, but it required considerable urging to enable the firemen to burn 26,731 pounds of dry Bering River coal in the same time. The percentage of refuse in the two cases was not far different, but it was divided very differently. With Pocahontas coal, twice as much ash falls through the grate as is removed from the furnace in the way of clinker and ash at cleaning periods. With Bering River coal, the accumulation within the furnace is far greater than the ash dropping through.

54. The coals are very similar chemically, the screening and cleaning of the Bering River coal having produced a slightly lower ash content and higher heating value than that of the Pocahontas. The coal consumed per square foot of grate per hour is 24.95 and 19.11, or 1.3 as much Pocahontas as Bering River. A deeper fire and heavier draft would have produced possibly an even higher rate of combustion of Pocahontas coal with higher CO in stack gasses and lower boiler efficiency, but the 19.11 pounds for the Bering River is an absolute maximum, which no amount of forcing could have increased appreciably because of the mass of clinker on the grates. The total actual evaporation for the two tests was 324,355 and

242,908 pounds, corresponding to 350,272 and 261,231 pounds equivalent, or hourly rates actual of 13,451 and 10,075 pounds and equivalent from and at 212° F. of 14,595 and 10,885 pounds. The Pocahontas coal gave a rating of 422.9, as against 315.5 boiler horsepower for the Bering River, or 1.34 times as much.

55. The Pocahontas coal shows only slightly better evaporation per pound of fuel than the Bering River, but it must be borne in mind that the boiler with the domestic fuel was being forced to a greater capacity, and, everything else being equal, should show slightly lower economic results. The boiler efficiency on both a dry coal and combustible basis is almost exactly 2 per cent higher for Pocahontas coal. The stack gasses show a considerable difference in composition because of the great excess air admitted in the test of the Bering River coal. An important difference is shown by the water put in the ash pit. With Pocahontas coal, a total of 1,612 pounds sufficed to keep the pit reasonably cool and prevent chipping of the concrete lining, but with Bering River coal it was necessary to place 3,886 pounds in the pit during the progress of the test, and even then the concrete broke badly. Not only was the heat radiated greater, but there was seldom the protecting coating of ashes which fell through the grates with considerable uniformity as the Pocahontas coal burned down.

56. The heat balance, items 115 to 133, shows the distribution of losses. It involves, however, no very noteworthy features, except that the total stack loss for the two coals was about the same. That is, any saving in reduction of CO loss on the part of the Bering River coal is entirely made up by the additional loss on account of dilution of stack gases. The fusing temperatures of the ash from the four samples of coal, inclosures P1, P2, P7, and P8, are again not consistent with the performance of the fuels in the furnace. The Pocahontas coal shows on the average an ash fusing temperature of 2,438° F., while the Bering River has the value 2,492° F., a value higher than that obtained on any single sample from the screening or washing operations. The only sample having anything like so high a fusing temperature is the float on 1.65 specific gravity, one-half inch to 4-mesh, inclosure L6, which shows 2,489° F. A satisfactory index for the tendency of clinker to form on a grate must, it appears, involve a great many factors other than the fusing point of ash.

57. Samples of clinker from the two tests and raw shale from Bering River coal were analyzed at the station, showing the following carbon-free composition:

Sample.	Pocahontas coal.		Bering River coal.		
	Clinker from grate.	Clinker from bridge wall.	Clinker from grate.	Clinker from bridge wall.	Raw shale.
SiO ₂	57.59	52.15	43.29	41.46	37.42
FeO ₂	14.86	18.68	16.36	22.64	6.36
Al ₂ O ₃	18.04	18.60	22.24	22.66	13.55
Mn ₂ O ₃	2.00	2.00			
CaO.....	3.73	5.00	10.64	10.47	40.17
CaSO ₄	1.04	1.04	1.00	.56	5.42
MgO.....	1.00	.89	2.23	2.30	2.94
K ₂ O.....	1.95	1.48	2.27	Trace	4.00

The silica, which is the only acid constituent, is in excess of the basic and neutral elements in the clinker from both coals, but the excess is greater for the Pocahontas. Most of the bases, which when existing alone are quite infusible, produce when combined with the other basic elements here present and with silica a cinder of lower fusing point than any of the constituents. Although these analyses show a separation into oxides and the neutral calcium sulphate, the mass actually exists as a complex combination in which the original properties of the constituents are entirely changed, and while the chemical analyses show a considerable difference in the silica, iron, alumina, and lime content, it can not with any certainty be said in how far these contribute to the marked difference in behavior of the coal on the grates.

VIII. RECOMMENDATION.

58. In spite of all the refinements of cleaning and washing, which reduced the ash content of dry Bering River coal from 14.06 as received to 5.42 in the dry coal actually fired, involving in the preparation a loss of 48.59 per cent of the fuel as mined, the highest obtainable rate of evaporation was 5.04 pounds of water from and at 212° F. per square foot of water heating surface and a combustion of 19.11 pounds of dry coal per square foot of grate surface per hour. Since the operation of the type of boiler on which these tests were conducted to meet full speed conditions in the service requires under somewhat greater draft the evaporation of at least 8 pounds of water per square foot of heating surface and a coal consumption of more than 30 pounds per square foot of grate surface per hour, it appears that Bering River coal is entirely unsuited to the needs of the service as a steam coal, and it is not recommended for use on standard Navy grate bars. Incidentally the cost of preparation even on a large scale would be \$6.34 per ton cleaned coal, so that, overlooking the difference in evaporative power, it would still not compete with eastern bituminous coals shipped to the west coast.

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APPENDIX I.

Method of obtaining items in Table III.

Item.

1. For reference.
- 2, 3, 4. Observed.
5. As weighed.
6. $\frac{\text{Item 5}}{\text{Item 4}}$.
- 7, 8. As weighed.
- 9, 10, 11. From Bureau of Mines coal analyses, inclosure (I).
12. $\frac{\text{Item 5 (100—item 9)}}{100}$.
13. $\frac{\text{Item 7 (100—item 10)}}{100}$.
14. $\frac{\text{Item 8 (100—item 11)}}{100}$.

15. Item 12—(item 13+item 14).
 16, 17, }
 18, 19, } From float and sink tests as noted in paragraph 26.
 20, 21, }
 22, 23, }
 24, 25, } From Bureau of Mines coal analyses, inclosure (L).
 26. }

$$27. \frac{\text{Item 24} - \text{item 25}}{\text{Item 24}} \times 100.$$

$$28. \frac{\text{Item 13}}{\text{Item 12}} \times 100.$$

$$29. 100 - \text{item 28}.$$

$$30. \frac{\text{Item 26} - \text{item 24}}{\text{Item 26} - \text{item 25}} \times 100.$$

$$31. \frac{\text{Item 24} - \text{item 25}}{\text{Item 26} - \text{item 25}} \times 100.$$

$$32. \frac{\text{Item 31} \times \text{item 26}}{\text{Item 24}} \times 100.$$

$$33. \frac{(\text{Item 16} \times \text{item 22}) + (\text{item 17} \times \text{item 23})}{100}.$$

APPENDIX II.

REPORT OF COMPARATIVE EVAPORATIVE TEST POCAHONTAS AND BERING RIVER,
ALASKA, COAL.*Method of obtaining items in Table IV.*

- Item.
 1, 2, 3, 4. For reference.
 5. From data corrected for temperature according to Smithsonian Meteorological Tables.
 6. Item 5 $\times$ 0.491.
 7. Observed.
 8. Item 7 + item 6.
 9. Observed.
 10, 11. From readings of differential draft gages.
 12, 13, 14. Observed.
 15. From steam tables corresponding to pressure in item 8.
 16. Observed.
 17, 18. From thermo-couple observations.
 19. Observed.
 20, 21. Observed.
 22. From recording anemometer.
 23, 24. Observed.
 25. From Weather Bureau tables corresponding to items 13 and 23.
 26. Calculated from density of dry, saturated steam corresponding to items 13 and 24.
 27. Average of items 25 and 26.
 28. Item 27 $\times$ density of dry, saturated steam corresponding to item 13.
 29. From formula for the density of dry air:

$$M = \frac{pV}{RT}$$

where M = weight in pounds of 1 cubic foot = item 29.

p = pressure of dry atmosphere in pounds per square foot = 144
 [item 6 - (pressure corresponding to item 13 $\times$ item 27)].

R = a constant, for air . . . 53.35.

T = absolute air temperature = 459.6 + item 13.

30, 31. For reference.

32. As weighed during test.

33. From Bureau of Mines coal analyses, inclosure (P).

$$34. \text{Item } 32 \times \frac{(100 - \text{item } 33)}{100}.$$

35, 36, } As weighed corrected for moisture by analysis.
37, 38. }

39. Item 35 + item 36 + item 37 + item 38.

40. Item 34 - item 39.

$$41. \frac{\text{Item } 35 + \text{item } 36 + \text{item } 37}{\text{Item } 34} \times 100.$$

42-52. From Bureau of Mines coal analyses, inclosure P.

$$53. \frac{\text{Item } 42}{100 - \text{item } 42} \times 100.$$

54-70. From Bureau of Mines analyses, inclosure P.

$$71. \frac{\text{Item } 34}{24}.$$

$$72. \frac{\text{Item } 40}{24}.$$

$$73. \frac{\text{Item } 71}{58\frac{1}{2}}.$$

$$74. \frac{\text{Item } 72}{58\frac{1}{2}}.$$

75, 76. Observed.

77. From formula—

x = quality in per cent dryness = item 77.

$$x = \frac{H_s + c_p (t_s - t_g) - q_b}{r_b} \times 100.$$

H_s = total heat of dry saturated steam corresponding to (item 76 + item 6).

c_p = mean specific heat of superheated steam at calorimeter pressure.

t_s = temperature within calorimeter = item 75.

t_g = temperature corresponding to calorimeter pressure (item 76 + item 6).

q_b = heat of liquid corresponding to boiler pressure, item 8.

r_b = heat of vaporization corresponding to boiler pressure, item 8.

78. 100 - item 77.

79. From formula—

$$H = q_b + r_b - q_f$$

where H = heat in dry saturated steam above feed temperature = item 79.

q_b and r_b as above.

q_f = heat of the liquid corresponding to feed temperature, item 16.

80. From formula—

$$H = q_b + x r_b - q_f$$

where H = heat in wet steam above feed temperature = item 80.

q_b , r_b and q_f as above.

x = item 77.

$$81. \frac{\text{Item } 80}{\text{Item } 79}.$$

$$82. \frac{\text{Item 79}}{970.4}.$$

83. As weighed.

84. Item 83 $\times$ item 81.

85. Item 84 $\times$ item 82.

$$86. \frac{\text{Item 84}}{24}$$

$$87. \frac{\text{Item 85}}{24}$$

$$88. \frac{\text{Item 87}}{2161}$$

$$89. \frac{\text{Item 87}}{34.5}$$

90. Based on 10 square feet of heating surface per boiler horsepower.

$$91. \frac{\text{Item 89}}{\text{Item 90}}$$

$$92. \frac{\text{Item 83}}{\text{Item 32}}$$

$$93. \frac{\text{Item 84}}{\text{Item 34}} \text{ or } \frac{\text{item 86}}{\text{item 71}}$$

$$94. \frac{\text{Item 85}}{\text{Item 32}}$$

$$95. \frac{\text{Item 85}}{\text{Item 34}} \text{ or } \frac{\text{item 87}}{\text{item 71}}$$

$$96. \frac{\text{Item 85}}{\text{Item 40}} \text{ or } \frac{\text{item 87}}{\text{item 72}}$$

$$97. \frac{\text{Item 95} \times 970.4}{\text{Item 67}} \times 100.$$

$$98. \frac{\text{Item 96} \times 970.4}{\text{Item 68}} \times 100.$$

99. From observations during daylight.

100-108. From analysis of pass and stack gas samples collected each half hour.

109. As weighed.

110. From ash analysis, inclosure P.

111. Item 109—item 110.

112. Quantity of air containing oxygen (0.232 parts by weight) to burn coal as per items 47 to 51 to flue gases of composition as per proportions of CO₂ and CO in items 105 and 107.

113. Quantity of air containing oxygen (0.232 parts by weight) to burn coal as per items 47 to 51 and produce flue gases as per items 105 to 108.

$$114. \frac{\text{Item 113} - \text{item 112}}{\text{Item 112}} \times 100.$$

115. Item 95 $\times$ 970.4.

116. Item 42 $\times$ H—

where H is heat required to vaporize moisture from a temperature of item 13 to superheated steam at a temperature of items 18 and 19.

117. Item $48 \times 9 \times H$ —
where H is as above.
118. Item $113 \times c_p \times (\text{Item } 18 - \text{item } 13)$ —
where c_p is the mean specific heat of the products of combustion over the rise in temperature.
119. $10170 \times$ pounds of carbon per pound of coal burned to CO .
120. $\frac{14544}{\text{Item } 34} \times \frac{1}{100} (\text{Item } 35 \times \text{item } 59 + \text{item } 36 \times \text{item } 61 + \text{item } 37 \times \text{item } 63 + \text{item } 38 \times \text{item } 65).$
121. $\frac{\text{Item } 28 \times \text{item } 113 \times (\text{item } 18 - \text{item } 13) \times c_p}{\text{Item } 29},$
where c_p is the mean specific heat of water vapor over the range item 13 to item 18.
122. Item $111 \times H$, where H is as in item 116.
123. Item $67 - (\text{item } 115 + \text{item } 116 + \text{item } 117 + \text{item } 118 + \text{item } 119 + \text{item } 120 + \text{item } 121 + \text{item } 122).$
124. Item 67.
125. Item $96 \times 970.4.$
126. $\frac{\text{Item } 116 \times \text{item } 34}{\text{Item } 40}$
127. $\frac{\text{Item } 117 \times \text{item } 34}{\text{Item } 40}$
128. $\frac{\text{Item } 118 \times \text{item } 34}{\text{Item } 40}$
129. $\frac{\text{Item } 119 \times \text{item } 34}{\text{Item } 40}$
130. $\frac{\text{Item } 121 \times \text{item } 34}{\text{Item } 40}$
131. $\frac{\text{Item } 122 \times \text{item } 34}{\text{Item } 40}$
132. Item $68 - (\text{item } 125 + \text{item } 126 + \text{item } 127 + \text{item } 128 + \text{item } 129 + \text{item } 130 + \text{item } 131).$
133. Item 68.

BUREAU OF MINES—COAL ANALYSIS REPORTS.

[By A. C. Fieldner, Chemist.]

INCLOSURE A1.

Laboratory No. 17736. Can No. 55445 (A7).

Sample of coal (Bering River).

From United States Naval Academy.

State, Maryland.

Town, Annapolis (Engineering Experiment Station).

Method of sampling (as received, not screened or cleaned).

Date of sampling, September 20, 1913. Date of analysis, September 30, 1913.

Collector, Charles Enzian.

[Air-dry loss, 1.2.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.88	2.11		
Volatile matter.....	16.22	16.02	16.37	19.05
Fixed carbon.....	68.97	68.11	69.87	80.95
Ash.....	13.93	13.76	14.06	
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.14	4.23	4.09	4.75
Carbon.....	76.14	75.20	76.82	80.39
Nitrogen.....	1.52	1.50	1.53	1.75
Oxygen.....	8.57	4.62	2.80	3.26
Sulphur.....	.70	.69	.70	.81
Ash.....	13.93	13.76	14.06	
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	7,316	7,225	7,381	8,589
B. t. u.....	13,169	13,005	13,286	15,460
Calorific value calculated from ultimate analysis:				
Calories.....		7,349		
B. t. u.....		13,228		

Real specific gravity, 1.43.

Fusing temperature of ash (in reducing atmosphere in molybdenum furnace) 1,271°C = 2320°F.

October 2, 1913.

INCLOSURE A2.

Laboratory No. 17741. Can No. 55459 (A7).

Sample of coal (Bering River).

State, Maryland; county, Anne Arundel.

Town, United States Naval Academy Engineering Experiment Station, Annapolis, Md.

Method of sampling: Over seven-eighths-inch mesh; hand-picked; quartered.

Date of sampling, September 19, 1913. Date of laboratory sampling, September 26. Date of analysis, September 30.

Collector, Charles Enzian.

[Air-dry loss 0.4.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.44	0.80		
Volatile matter.....	18.47	18.40	18.55	19.65
Fixed carbon.....	75.51	75.24	75.94	80.35
Ash.....	5.58	5.56	5.61	
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.40	4.42	4.37	4.63
Carbon.....	84.55	84.25	84.93	89.97
Nitrogen.....	1.62	1.61	1.62	1.72
Oxygen.....	3.17	3.48	2.78	2.95
Sulphur.....	.68	.68	.69	.73
Ash.....	5.58	5.56	5.61	
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,144	8,115	8,181	8,667
B. t. u.....	14,659	14,607	14,726	15,601
Calorific value calculated from ultimate analysis:				
Calories.....		8,194		
B. t. u.....		14,749		

Fusing temperature of ash (in reducing atmosphere in molybdenum furnace): 1,263° C. = 2,305° F.

October 1, 1913.

INCLOSURE A3.

Laboratory No. 17742. Can No. 55377 (A3).
 Sample of coal (Bering River).
 State, Maryland.
 Town, United States Naval Academy, Engineering Experiment Station, Annapolis, Md.
 Method of sampling: Screenings through seven-eighths inch and over one-half inch; quartered.
 Date of sampling, September 19, 1913. Date of laboratory sampling, September 23. Date of analysis, September 30.
 Collector, Charles Ensian.

(Air-dry loss, 0.5.)

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.49	0.97	.....	.....
Volatile matter.....	17.37	17.29	17.45	20.02
Fixed carbon.....	69.44	69.10	69.77	79.98
Ash.....	12.70	12.64	12.77	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.21	4.24	4.17	4.78
Carbon.....	77.68	77.21	77.97	80.38
Nitrogen.....	1.56	1.55	1.57	1.80
Oxygen.....	3.28	3.60	2.84	3.26
Sulphur.....	.67	.67	.68	.78
Ash.....	12.70	12.64	12.77	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	7,460	7,424	7,497	8,596
B. t. u.....	13,428	13,363	13,495	15,471
Calorific value calculated from ultimate analysis:				
Calories.....		7,558	.....	.....
B. t. u.....		13,601	.....	.....

Fusing temperature of ash (in reducing atmosphere in molybdenum furnace): 1,227° C.—2,341° F. Sp. gr. 1.45.
 October 1, 1913.

INCLOSURE A4.

Laboratory No. 17734. Can No. 55376 (A4).
 Sample of coal (Bering River).
 From United States Naval Academy.
 State, Maryland.
 Town, Annapolis (Engineering Experiment Station).
 Method of sampling: Screening through one-half inch and over No. 4 mesh; quartered.
 Date of sampling, September 19, 1913. Date of analysis, September 30, 1913.
 Collector, Charles Ensian.

(Air-dry loss, 0.5.)

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.85	1.37	.....	.....
Volatile matter.....	16.18	16.10	16.32	19.54
Fixed carbon.....	66.62	66.27	67.19	80.46
Ash.....	16.35	16.26	16.49	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.00	4.04	3.94	4.72
Carbon.....	73.59	73.51	74.53	80.25
Nitrogen.....	1.51	1.50	1.52	1.82
Oxygen.....	3.57	4.01	2.83	3.28
Sulphur.....	.68	.68	.69	.83
Ash.....	16.35	16.26	16.49	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	7,119	7,082	7,180	8,596
B. t. u.....	12,814	12,748	12,924	15,476
Calorific value calculated from ultimate analysis:				
Calories.....		7,175	.....	.....
B. t. u.....		12,915	.....	.....

Fusing temperature of ash (in reducing atmosphere in molybdenum furnace), 1,255° C.—22,91° F.
 October 2, 1913.

INCLOSURE A5.

Laboratory No. 17737. Can No. 55380 (A5).

Sample of coal (Bering River).

From United States Naval Academy.

State, Maryland.

Town, Annapolis (Engineering Experiment Station).

Method of sampling: Screening through No. 4 and over 10 mesh.

Date of sampling, September 19, 1913. Date of analysis, September 30, 1913.

Collector, Charles Enzian.

[Air-dry loss, 0.6.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.90	1.50	-----	-----
Volatile matter.....	15.64	15.54	15.78	19.19
Fixed carbon.....	65.86	65.47	66.46	80.81
Ash.....	17.60	17.49	17.76	-----
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.04	4.09	3.98	4.84
Carbon.....	72.38	71.94	73.03	88.80
Nitrogen.....	1.52	1.51	1.53	1.85
Oxygen.....	3.77	4.28	3.00	3.65
Sulphur.....	.69	.69	.70	.85
Ash.....	17.60	17.49	17.76	-----
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	6,994	6,951	7,057	8,581
B. t. u.....	12,589	12,512	12,703	15,446
Calorific value calculated from ultimate analysis:				
Calories.....	-----	7,052	-----	-----
B. t. u.....	-----	12,694	-----	-----

Fusing temperature of ash (in reducing atmosphere in molybdenum furnace), 1,245° C.=2,273° F.

October 1, 1913.

INCLOSURE A6.

Laboratory No. 17735. Can No. 55381 (A6).

Sample of coal (Bering River).

From United States Naval Academy.

State, Maryland.

Town, Annapolis (Engineering Experiment Station).

Method of sampling: Screening through No. 10-mesh screen; not cleaned.

Date of sampling, September 20, 1913.

Date of analysis, September 30, 1913.

Collector, Charles Enzian.

[Air-dry loss, 0.9.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	1.10	2.03	-----	-----
Volatile matter.....	15.06	14.92	15.23	20.73
Fixed carbon.....	57.59	57.05	58.23	79.27
Ash.....	26.25	26.00	26.54	-----
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	3.63	3.70	3.54	4.82
Carbon.....	63.77	63.17	64.43	87.78
Nitrogen.....	1.37	1.36	1.39	1.89
Oxygen.....	4.37	5.17	3.44	4.68
Sulphur.....	.61	.60	.61	.83
Ash.....	26.25	26.00	26.54	-----
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	6,137	6,079	6,205	8,447
B. t. u.....	11,047	10,942	11,169	15,206
Calorific value calculated from ultimate analysis:				
Calories.....	-----	6,169	-----	-----
B. t. u.....	-----	11,104	-----	-----

Fusing temperature of ash (in reducing atmosphere in molybdenum furnace), 1,331° C.=2,428° F.

October 2, 1913.

INCLOSURE A7.

Laboratory No. 17788. Can No. 55387 (A1).
 Sample of coal (Bering River).
 From United States Naval Academy.
 State, Maryland. County, Anne Arundel.
 Town, Annapolis (Engineering Experiment Station).
 Method of sampling: Screenings through seven-eighths inch mesh; quartered.
 Date of sampling, September 18, 1913. Date of analysis, September 30, 1913.
 Collector, Charles Enslan.

[Air-dry loss, 0.9.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.88	1.72	.....	.....
Volatile matter.....	16.37	16.23	16.51	20.12
Fixed carbon.....	64.97	64.42	65.55	79.88
Ash.....	17.78	17.63	17.94	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	3.95	4.01	3.89	4.74
Carbon.....	72.30	71.69	72.94	88.88
Nitrogen.....	1.55	1.54	1.57	1.91
Oxygen.....	3.74	4.46	2.98	3.64
Sulphur.....	.68	.67	.68	.83
Ash.....	17.78	17.63	17.94	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	6,951	6,892	7,013	8,546
B. t. u.....	12,512	12,406	12,623	15,383
Calorific value calculated from ultimate analysis:				
Calories.....	.....	6,996	.....	.....
B. t. u.....	.....	12,598	.....	.....

Fusing temperature of ash (in reducing atmosphere of molybdenum furnace), 1,227° C.=2,241° F.
 October 2, 1913.

INCLOSURE A8.

Laboratory No. 17897. Can No. 58239.
 Sample of Pocahontas lump coal.
 Method of sampling: Over seven-eighths-inch screen.
 Net weight, 978.5 grams.
 Date of laboratory sampling, October 22, 1913. Date of analysis, November 3, 1913.
 For Bureau of Mines section, United States Naval Experiment Station, Annapolis, Md.

[Air-dry loss, 1.1.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.53	1.64	.....	.....
Volatile matter.....	19.98	19.76	20.09	21.55
Fixed carbon.....	72.76	71.95	73.15	78.45
Ash.....	6.73	6.65	6.76	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.45	4.52	4.41	4.73
Carbon.....	84.19	83.25	84.64	90.78
Nitrogen.....	1.12	1.11	1.13	1.21
Oxygen.....	2.91	3.88	2.46	2.64
Sulphur.....	.60	.59	.60	.64
Ash.....	6.73	6.65	6.76	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,104	8,013	8,147	8,738
B. t. u.....	14,587	14,423	14,666	15,728
Calorific value calculated from ultimate analysis:				
Calories.....	.....	8,129	.....	.....
B. t. u.....	.....	14,632	.....	.....

Fusing temperature of ash, in reducing atmosphere: 1,370° C.=2,498° F.
 November 6, 1913.

INCLOSURE A9.

Laboratory No. 17896. Can No. 58240.

Sample of Pocahontas coal.

Method of sampling: Through seven-eighth-inch and on one-half-inch screen.

Net weight, 1,047.6 grams.

Date of laboratory sampling, October 21, 1913. Date of analysis, October 23, 1913.

For Bureau of Mines section, Naval Engineering Experiment Station, Annapolis, Md.

[Air-dry loss, 0.7.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.67	1.38		
Volatile matter.....	20.72	20.57	20.85	22.37
Fixed carbon.....	71.92	71.41	72.41	77.63
Ash.....	6.69	6.64	6.73	
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.51	4.56	4.47	4.79
Carbon.....	83.78	83.19	84.25	90.44
Nitrogen.....	1.17	1.16	1.15	1.27
Oxygen.....	3.21	3.31	2.62	2.80
Sulphur.....	.64	.64	.65	.70
Ash.....	6.69	6.64	6.73	
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,082	8,025	8,137	8,724
B. t. u.....	14,548	14,445	14,647	15,703
Calorific value calculated from ultimate analysis:				
Calories.....		8,142		
B. t. u.....		14,656		

Fusing temperature of ash, in reducing atmosphere: 1,313° C.=2,395° F.
November 5, 1913.

INCLOSURE A10.

Laboratory No. 17898. Can No. 55454.

Test No. P8.

Sample of Pocahontas coal.

Special marks: Through one-half inch and on one-fourth mesh.

Net weight, 1,155.6 grams.

Date of laboratory sampling, October 21, 1913. Date of analysis, October 26, 1913.

For Bureau of Mines section, Naval Engineering Experiment Station, Annapolis, Md.

[A r-dry loss, 0.7.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.88	1.56		
Volatile matter.....	20.95	20.81	21.14	22.37
Fixed carbon.....	72.70	72.20	73.24	77.63
Ash.....	5.47	5.43	5.52	
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.55	4.60	4.50	4.76
Carbon.....	84.74	84.16	85.49	90.48
Nitrogen.....	1.20	1.19	1.21	1.28
Oxygen.....	3.41	3.99	2.64	2.80
Sulphur.....	.63	.63	.64	.68
Ash.....	5.47	5.43	5.52	
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,199	8,132	8,260	8,742
B. t. u.....	14,740	14,638	14,868	15,736
Calorific value calculated from ultimate analysis:				
Calories.....		8,227		
B. t. u.....		14,809		

Fusing temperature of ash, in reducing atmosphere: 1,375° C.=2,507° F.
November 5, 1913.

INCLOSURE A11.

Laboratory No. 17899. Can No. 55455.

Test No. P4.

Sample of Pocahontas coal.

Special marks: Through 4 mesh and on 10 mesh.

Net weight, 1,063.4 grams.

Date of laboratory sampling, October 21, 1913. Date of analysis, October 29, 1913.

For Bureau of Mines section, Naval Engineering Experiment Station, Annapolis, Md.

[Air-dry loss, 0.8.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.91	1.69	.....	.....
Volatile matter.....	21.52	21.35	21.72	22.72
Fixed carbon.....	73.19	72.61	73.86	77.28
Ash.....	4.38	4.35	4.42	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.70	4.75	4.64	4.85
Carbon.....	85.42	84.75	86.21	90.19
Nitrogen.....	1.23	1.22	1.24	1.30
Oxygen.....	3.57	4.24	2.79	2.93
Sulphur.....	.70	.69	.70	.73
Ash.....	4.38	4.35	4.42	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,292	8,226	8,367	8,754
B. t. u.....	14,926	14,807	15,061	15,757
Calorific value calculated from ultimate analysis:				
Calories.....		8,318	.....	.....
B. t. u.....		14,972	.....	.....

Fusing temperature of ash, in reducing atmosphere: 1,271° C. = 2,320° F.

November 5, 1913.

INCLOSURE A12.

Laboratory No. 17900. Can No. 55444.

Sample of Pocahontas coal.

Method of sampling: Dust through 10 mesh.

Net weight, 1,031.8 grams.

Date of laboratory sampling, October 22, 1913. Date of analysis, October 29, 1913.

For Bureau of Mines section, Naval Engineering Experiment Station, Annapolis Md.

[Air-dry loss, 1.7.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.79	2.46	.....	.....
Volatile matter.....	21.49	21.13	21.66	22.81
Fixed carbon.....	72.72	71.49	73.30	77.19
Ash.....	5.00	4.92	5.04	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.70	4.81	4.65	4.90
Carbon.....	84.67	83.25	85.35	89.88
Nitrogen.....	1.23	1.21	1.24	1.31
Oxygen.....	3.55	4.97	2.86	3.00
Sulphur.....	.85	.84	.86	.91
Ash.....	5.00	4.92	5.04	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,219	8,081	8,285	8,725
B. t. u.....	14,794	14,546	14,913	15,705
Calorific value calculated from ultimate analysis:				
Calories.....		8,189	.....	.....
B. t. u.....		14,740	.....	.....

Fusing temperature of ash, in reducing atmosphere: 1,234° C. = 2,253° F.

November 5, 1913.

INCLOSURE A13.

Laboratory No. 17739. Can No. 55386.

Sample of Pocahontas No. 3 coal.

From Pocahontas Consolidated Collieries Co. (Inc.). Mine, "Baby."

State, Maryland. Bed, Pocahontas No. 3.

Town, Annapolis (engineering experiment station).

Method of sampling: Screenings through seven-eighths inch mesh; quartered.

Date of sampling, September 18, 1913. Date of analysis, September 30, 1913.

Collector, Charles Enzian.

[Air-dry loss, 1.2.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.75	1.90		
Volatile matter.....	21.81	21.56	21.98	23.14
Fixed carbon.....	72.48	71.62	73.00	76.86
Ash.....	4.98	4.92	5.02	
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.82	4.89	4.77	5.02
Carbon.....	85.17	84.18	85.81	90.35
Nitrogen.....	1.23	1.22	1.24	1.31
Oxygen.....	3.08	4.08	2.44	2.56
Sulphur.....	.72	.71	.72	.76
Ash.....	4.98	4.92	5.02	
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,210	8,115	8,272	8,710
B. t. u.....	14,778	14,607	14,890	15,678
Calorific value calculated from ultimate analysis:				
Calories.....		8,327		
B. t. u.....		14,989		

Real specific gravity, 1.33.

Fusing temperature of ash (in reducing atmosphere in molybdenum furnace), 1,227° C.=2,241° F.

October 1, 1913.

INCLOSURE A14.

Laboratory No. 17740. Can No. 55458.

Sample of coal (Pocahontas No. 3).

From Pocahontas Consolidated Collieries Co. (Inc.). Mine, "Baby."

State, Maryland.

Town, United States Naval Academy Engineering Experiment Station, Annapolis, Md.

Method of sampling: Over seven-eighth-inch mesh; hand-picked; quartered.

Date of sampling, September 18, 1913. Date of laboratory sampling, September 26. Date of analysis, September 30.

Collector, Charles Enzian.

[Air-dry loss, 0.9.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.48	1.38		
Volatile matter.....	21.80	21.60	21.90	22.75
Fixed carbon.....	73.99	73.32	74.35	77.25
Ash.....	3.73	3.70	3.75	
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.74	4.80	4.72	4.90
Carbon.....	85.30	85.52	86.72	90.10
Nitrogen.....	1.22	1.21	1.22	1.28
Oxygen.....	3.21	4.08	2.88	2.99
Sulphur.....	.70	.69	.70	.73
Ash.....	3.73	3.70	3.75	
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,377	8,302	8,418	8,746
B. t. u.....	15,079	14,944	15,152	15,743
Calorific value calculated from ultimate analysis:				
Calories.....		8,404		
B. t. u.....		15,127		

Fusing temperature of ash (in reducing atmosphere in molybdenum furnace): 1,213° C.=2,215° F. Real sp. gr., 1.29.

October 1, 1913.

INCLOSURE B.

TABLE I.—Analyses of screened Bering River and Pocahontas coal (dry coal basis).

BERING RIVER, ALASKA, COAL.

[Test 362. L. L.]

Inclosure.....	A1	A2	A3	A4	A5	A6	A7
Bureau of Mines Laboratory No.	17736	17741	17742	17734	17737	17735	17738
	As received, not cleaned or screened.	Hand-picked over $\frac{1}{2}$ -inch mesh.	Through $\frac{1}{2}$ -inch and over $\frac{1}{2}$ -inch mesh.	Through $\frac{1}{2}$ -inch and over 4 mesh.	Through 4 and over 10 mesh.	Slack through 10 mesh.	Screenings through $\frac{1}{2}$ -inch mesh.
Proximate:							
Volatile matter.....	16.37	18.55	17.46	16.32	15.78	15.23	16.51
Fixed carbon.....	69.57	76.84	69.77	67.19	68.46	58.23	65.65
Ash.....	14.06	5.61	12.77	16.49	17.76	26.54	17.94
	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Ultimate:							
Hydrogen.....	4.09	4.37	4.17	3.94	3.98	3.54	3.89
Carbon.....	76.82	84.93	77.97	74.53	73.03	64.48	72.94
Nitrogen.....	1.53	1.62	1.57	1.52	1.53	1.39	1.57
Oxygen.....	2.80	2.78	2.84	2.83	3.00	3.44	2.98
Sulphur.....	.70	.69	.68	.69	.70	.61	.68
Ash.....	14.06	5.61	12.77	16.49	17.76	26.54	17.94
	100.00	100.00	100.00	100.00	100.00	100.00	100.00
B. t. u.....	13,286	14,726	13,495	12,924	12,703	11,169	12,623
Real specific gravity.....	1.43	.....	1.45	.....	.....	.....	.....
Fusing temperature of ash, °F.....	2,320	2,306	2,341	2,291	2,278	2,428	2,341
B. t. u. ash and moisture free.....	15,460	15,601	15,471	15,476	15,446	15,205	15,383

POCAHONTAS COAL.

Inclosure.....	A8	A9	A10	A11	A12	A13
Bureau of Mines Laboratory No.	17897	17896	17896	17899	17900	17739
	Over $\frac{1}{2}$ -inch mesh.	Through $\frac{1}{2}$ -inch and over $\frac{1}{2}$ -inch mesh.	Through $\frac{1}{2}$ -inch and over 4 mesh.	Through 4 and over 10 mesh.	Dust through 10 mesh.	Screenings through $\frac{1}{2}$ -inch mesh.
Proximate:						
Volatile matter.....	20.09	20.86	21.14	21.72	21.66	21.98
Fixed carbon.....	73.15	72.41	73.54	73.56	73.30	73.00
Ash.....	6.76	6.73	5.62	4.42	5.04	5.02
	100.00	100.00	100.00	100.00	100.00	100.00
Ultimate:						
Hydrogen.....	4.41	4.47	4.50	4.64	4.65	4.77
Carbon.....	84.64	84.35	85.49	86.21	85.35	85.51
Nitrogen.....	1.13	1.18	1.21	1.24	1.24	1.24
Oxygen.....	2.46	2.62	2.64	2.79	2.86	2.44
Sulphur.....	.60	.65	.64	.70	.86	.72
Ash.....	6.76	6.73	5.62	4.42	5.04	5.02
	100.00	100.00	100.00	100.00	100.00	100.00
B. t. u.....	14,665	14,647	14,868	15,061	14,913	14,890
Real specific gravity.....	1.29	.....	.....	.....	.....	1.33
Fusing temperature of ash, °F.....	2,498	2,395	2,507	2,320	2,263	2,241
B. t. u. ash and moisture free.....	15,728	15,703	15,736	15,757	15,705	15,678

INCLOSURE C.

FLOAT AND SINK TESTS, BERING RIVER COAL.

OCTOBER 11, 1913.

DIRECTOR: I inclose herewith Mr. A. C. Fieldner's reports on the float and sink tests of the Bering River coal samples gathered by Mr.ENZIAN, at the naval experimental station, Annapolis, September 20, 1913. Mr. Fieldner's letter explains the nature of the tests. I will add these comments:

Owing to not having exactly the same size screens as used at Annapolis, he used 1-inch instead of seven-eighths inch, but there would be no essential difference in the results. It was understood that only coal over 10 mesh in size would be suitable for the purposes of the Navy.

It will be observed that Mr. Fieldner states that the oversize was crushed and passed through the screens. In this respect it makes the results somewhat more favorable than would be in practice, since the oversize was known to be of better grade than the undersize. However, the difference is not serious.

In column 3, pages 1 and 2, is given the percentage of each size of the original sample. In column 4 is given the percentages of each size which is lighter than 1.35 specific gravity. It will be observed that in the coarser sizes above 10 mesh, 82 to 90 per cent is lighter than 1.35 specific gravity, and between 10 mesh and 60 mesh, 68 per cent is lighter than 1.35. This indicates that the washing would be a comparatively simple matter. The impurities are evidently separable from the coal, and for the most part are much heavier than the coal, so that there would be little difficulty in making the separation with a good coal-washing system, at least for coal over 60 mesh in size. As only 4.2 per cent passed through 60 mesh, this might be thrown away without the loss being serious, since it would represent only a small fraction of the total.

Column 5 shows the percentages of the original sample of the pure coal which might be considered less than 1.35 specific gravity. The following sizes are shown: 40.39 per cent of 1 inch to one-half inch, 14.95 per cent one-half inch to one-fourth inch, 15.78 per cent from one-fourth inch to 10 mesh, and 10.24 per cent from 10 mesh to 60 mesh, making a total of 81.36 per cent of the original sample which would be coal containing ash less than 2.87 per cent; this result showing better than the hand-picked coarser samples. This is an unusually favorable showing for washing. Of course, it would not be possible to obtain such good results in practice, but it is probable that the coal can be washed so that it will contain less than 5 per cent, and possibly 4 per cent, of ash.

I therefore recommend that the naval authorities proceed to assemble a temporary plant to wash the Bering River coal, amounting to about 50 tons or more now on hand. In this they can be assisted by Mr. CharlesENZIAN, who has already obtained agreements to supply a jig washer at the cost of transportation, the washer to be so set up that the raw coal can be weighed and put into the hopper for regular feeding, and arrangements made by means of a countershaft so that the speed of the jig can be varied to suit the kind of coal being washed. There should be a box or some temporary bin for the collection and sampling of the refuse slate; also a tight box for the collection of the pure coal, and a launder and settling box for retention and sampling of the coal sludge. Suitable water connections must be made to supply water to the jig.

Respectfully, yours,

Geo. S. RICE.

INCLOSURE C.

FLOAT AND SINK TESTS ON 108 POUNDS BERING RIVER COAL.

OCTOBER 11, 1913.

Mr. RICE: On receipt at the laboratory, the entire sample was screened over a 1 inch screen. The oversize was crushed, taking care to avoid making fines, until all passed through the 1-inch screen. It was then mixed and divided. Fifty-four pounds (laboratory No. 17796) was sized. Each size except the dust through 60 mesh was subjected to float and sink tests on solutions of different gravities, thus dividing it into 5 fractions. The results are given in the attached table. All ash percentages are computed to the dry basis. The sums in column 7 are the computed percentages of ash in the coal of each size before floating. The sum in column 8, 11.16 per cent, is computed percentage of ash in the unwashed coal before sizing, which should check with the ash by direct analysis of the "as received" sample. The coal as received analyzed 10.49 per cent ash. This agreement proves the accuracy of the analytical work and the computed results.

In the lower section of the table is computed the percentage separation produced by each particular gravity of solution, also the per cent ash in the float and sink of each gravity.

The second half of the sample (54 pounds) was all crushed to pass one-half inch, mixed and divided, 27 pounds (laboratory No. 17834) being floated at one-half inch size and the other 27 pounds (laboratory No. 17833) being further crushed to one-fourth inch size and floated in a similar manner. The results are given in the table in the two groups below the results of the sized sample.

Yours, very truly,

A. C. FIELDNER.

INCLOSURE C.

Results of float-and-sink tests on 108-pound sample of Bering River coal, taken by Charles Enzian, at the Naval Experiment Station, Annapolis.

[October 3, 1912. Laboratory No. 17798.]

Ash in raw coal (dry basis), 10.49 per cent.	Grams of each size.	Amount of each size in per cent of original sample.	Amount of each fraction in per cent of each size.	Amount of each fraction in per cent of original sample.	Amount of ash (dry basis) in each fraction.		
					As per cent of fraction.	As per cent of each size.	As per cent of original sample.
1	2	3	4	5	6	7	8
54 pounds, sized, laboratory No. 17798:							
1 inch to $\frac{1}{2}$ inch.....	8,566	44.6					
Less than 1.35 specific gravity.....			90.54	40.39	2.72	2.46	
1.35 to 1.45.....			2.43	1.08	13.72	.38	
1.45 to 1.55.....			1.82	.81	23.37	.43	
1.55 to 1.65.....			.00	.00	.00	.00	
More than 1.65.....			5.21	2.32	66.39	3.46	
Sum.....			100.00	44.60		6.68	2.98
$\frac{1}{2}$ inch to $\frac{1}{4}$ inch.....							
Less than 1.35 specific gravity.....	3,273	17.0					
1.35 to 1.45.....			87.97	14.95	2.77	2.44	
1.45 to 1.55.....			2.56	.44	14.92	.38	
1.55 to 1.65.....			.71	.12	24.38	.17	
More than 1.65.....			.65	.11	32.75	.21	
Sum.....			100.00	17.00		9.25	1.57
$\frac{1}{4}$ inch to 10 mesh.....							
Less than 1.35 specific gravity.....	3,693	19.2			(13.57)		
1.35 to 1.45.....			82.18	15.78	2.82	2.32	
1.45 to 1.55.....			2.60	.50	21.13	.55	
1.55 to 1.65.....			1.42	.27	27.61	.39	
More than 1.65.....			.88	.17	37.97	.33	
Sum.....			100.00	19.20		13.14	2.52

FLOAT-AND-SINK TEST 2.

1	2	3	4	5	6	7	8
10 mesh to 60 mesh.....	2,875	15.0					
Less than 1.35 specific gravity.....			68.25	10.24	2.87	1.96	
1.35 to 1.45.....			3.86	.58	12.97	.50	
1.45 to 1.55.....			2.55	.38	24.98	.64	
1.55 to 1.65.....			1.60	.24	32.57	.52	
More than 1.65.....			23.74	3.56	70.07	16.63	
Sum.....			100.00	15.00		20.25	3.04
60 mesh and finer.....	806	4.2				25.01	1.05
Total.....	19,213	100.0					11.16
Laboratory No. 17834.							
27 pounds crushed to pass $\frac{1}{2}$ inch.					10.39		
$\frac{1}{2}$ inch to 60 mesh.....		94.74					
Less than 1.35 specific gravity.....			86.48	51.93	2.84	2.33	

Results of float-and-sink tests on 108-pound sample of Bering River coal, taken by Charles Enzian, at the Naval Experiment Station, Annapolis—Continued.

FLOAT-AND-SINK TEST 2—Continued.

Ash in raw coal (dry basis), 10.49 per cent.	Grams of each size.	Amount of each size in per cent of original sample.	Amount of each fraction in per cent of each size.	Amount of each fraction in per cent of original sample.	Amount of ash (dry basis) in each fraction.		
					As per cent of fraction.	As per cent of each size.	As per cent of original sample.
1	2	3	4	5	6	7	8
1.35 to 1.45.....			2.80	2.74	13.02	0.38	.....
1.45 to 1.55.....			1.05	.99	22.63	.23	.....
1.55 to 1.65.....			.57	.54	36.74	.20	.....
More than 1.65.....			9.01	8.54	72.37	6.18	.....
Sum.....			100.00	94.74		9.31	9.31
60 mesh and finer.....		5.26				21.82	1.15
Total.....		100.00					10.46
Laboratory No. 17833.....					10.58		
37 pounds crushed to pass $\frac{1}{2}$ inch.....		93.01					
$\frac{1}{2}$ inch to 60 mesh.....							
Less than 1.35 specific gravity.....			85.48	79.49	8.15	2.50	
1.35 to 1.45.....			3.40	3.17	7.31	.23	
1.45 to 1.55.....			1.13	1.06	28.23	.30	
1.55 to 1.65.....			.81	.75	26.87	.20	
More than 1.65.....			9.18	8.54	71.10	6.07	
Sum.....			100.00	93.01		9.30	9.30
60 mesh and finer.....		6.99				17.56	1.23
Total.....		100.00					10.53

FLOAT-AND-SINK-TEST 3.

Description.	Specific gravity of solution.	Respective amounts of float and sink.				Per cent ash (dry basis).		
		As per cent of each size.		As per cent of original sample.				
		Float.	Sink.	Float.	Sink.	Float.	Sink.	Raw coal.
1	2	3	4	5	6	7	8	9
54-pound sized:								
$\frac{1}{2}$ inch to $\frac{3}{4}$ inch.....	1.35	90.54	9.46	40.39	4.21	2.72	44.60	6.68
Do.....	1.45	92.97	7.03	41.47	3.13	3.01	55.26	.....
Do.....	1.55	94.79	5.21	42.28	2.32	3.40	66.39	.....
Do.....	1.65	94.79	5.21	42.28	2.32	3.40	66.39	.....
$\frac{3}{4}$ inch to $\frac{1}{2}$ inch.....	1.35	87.97	12.03	14.95	2.05	2.77	56.61	9.25
Do.....	1.45	90.53	9.47	15.39	1.61	3.12	68.01	.....
Do.....	1.55	91.24	8.76	15.51	1.49	3.28	71.52	.....
Do.....	1.65	91.89	8.11	15.63	1.38	3.49	74.61	.....
$\frac{1}{2}$ inch to 10 mesh.....	1.35	82.18	17.82	15.78	3.42	2.82	60.75	13.14
Do.....	1.45	84.78	15.22	16.28	2.92	3.38	67.54	.....
Do.....	1.55	86.20	13.80	16.55	2.65	3.78	71.60	.....
Do.....	1.65	87.08	12.92	16.72	2.48	4.13	73.91	.....
10 mesh to 60 mesh.....	1.35	68.25	31.75	10.24	4.76	2.87	57.62	20.25
Do.....	1.45	72.11	27.89	10.82	4.18	3.41	63.82	.....
Do.....	1.55	74.66	25.34	11.20	3.80	4.14	67.70	.....
Do.....	1.65	76.26	23.74	11.44	3.56	4.74	70.07	.....
37 pounds crushed to $\frac{1}{2}$ inch—								
$\frac{1}{2}$ inch to 60 mesh.....	1.35	86.48	13.52	81.93	12.81	2.84	54.52	9.31
Do.....	1.45	89.37	10.63	84.67	10.07	3.20	65.57	.....
Do.....	1.55	90.42	9.58	85.66	9.08	3.42	70.25	.....
Do.....	1.65	90.99	9.01	86.20	8.54	3.63	72.37	.....
37 pounds crushed to $\frac{1}{2}$ inch—								
$\frac{1}{2}$ inch to 60 mesh.....	1.35	85.48	14.52	79.49	13.52	3.15	50.33	9.30
Do.....	1.45	88.88	11.12	82.66	10.35	3.31	63.50	.....
Do.....	1.55	90.01	9.99	83.72	9.29	3.63	67.53	.....
Do.....	1.65	90.82	9.18	84.47	8.54	3.83	71.10	.....

INCLOSURE D.

Results of float-and-sink tests on Pocahontas coal used in Bering River coal tests at the Naval Engineering Experiment Station, Annapolis, Oct. 25, 1913.

[Each sample except the 10-mesh coal was subjected to successive float-and-sink tests on solutions of 1.35, 1.45, 1.55, and 1.65, without any sizing or crushing. The 10-mesh sample was screened over 60-mesh, to remove the fine dust, which does not subside readily. The results are given in the following table. All ash percentages are computed to a dry basis.]

Description.	Amount of each fraction in per cent of each size.	Amount of ash (dry basis) in each fraction.	
		As per cent of fraction.	As per cent of size.
1	2	3	4
Label No. 17930; ash in dry coal, 6.19 per cent; lumps over $\frac{1}{2}$ -inch screen:			
Less than 1.35 specific gravity.....	85.90	3.21	2.76
1.35 to 1.45.....	4.26	12.00	.61
1.45 to 1.55.....	5.74	20.02	1.15
1.55 to 1.65.....	2.08	30.58	.64
More than 1.65.....	2.02	55.76	1.13
Sum.....	100.00		6.19
Label No. 17936; ash in dry coal, 6.60 per cent; lumps over $\frac{1}{2}$ -inch screen:			
Less than 1.35 specific gravity.....	86.34	3.40	2.94
1.35 to 1.45.....	5.87	12.78	.69
1.45 to 1.55.....	4.26	21.38	.91
1.55 to 1.65.....	1.53	29.98	.46
More than 1.65.....	2.50	63.98	1.60
Sum.....	100.00		6.60
Label No. 17942; ash in dry coal, 5.39 per cent; through $\frac{1}{2}$ -inch and on $\frac{1}{2}$ -inch screen:			
Less than 1.35 specific gravity.....	90.50	2.94	2.66
1.35 to 1.45.....	4.03	13.48	.64
1.45 to 1.55.....	2.35	21.55	.61
1.55 to 1.65.....	1.18	30.61	.36
More than 1.65.....	1.94	67.86	1.32
Sum.....	100.00		5.39
Label No. 17948; ash in dry coal, 4.23 per cent; through $\frac{1}{2}$ -inch on 10-mesh screen:			
Less than 1.35 specific gravity.....	95.74	2.42	2.32
1.35 to 1.45.....	.98	11.21	.11
1.45 to 1.55.....	1.21	19.92	.24
1.55 to 1.65.....	.54	28.80	.16
More than 1.65.....	1.53	72.31	1.11
Sum.....	100.00		3.94
Label No. 17954; ash in dry coal, 4.47 per cent; through 10-mesh on 60-mesh:			
Less than 1.35 specific gravity.....	93.12	1.83	1.70
1.35 to 1.45.....	2.53	8.78	.23
1.45 to 1.55.....	1.28	15.29	.20
1.55 to 1.65.....	.60	20.73	.12
More than 1.65.....	2.47	71.61	1.77
Sum.....	100.00		4.01
Label No. 17960; dust through 60-mesh from 10-mesh screenings.....		6.54	
Screenings through 10-mesh.....	(10 to 60 mesh... Through 60-mesh.	Grams. 1,785.8— 449.3— 2,235.1	Per cent. 79.90 20.10 100.00

160 COAL IN ALASKA FOR USE IN UNITED STATES NAVY.

In the following table is shown the percentage of separation produced by each particular gravity of solution, also the per cent ash in the float and sink of each gravity:

[A. C. Fieldner, chemist.]

Description.	Specific gravity of solution.	Percentage of—		Percentage of ash (dry basis).		
		Floot.	Sink.	Floot.	Sink.	Raw coal.
1	2	3	4	5	6	7
Laboratory No. 17930; lump on $\frac{1}{2}$ -inch screen.....	1.35 1.45 1.55 1.65	86 90 96 98	14 10 4 2	8.21 8.03 4.61 5.16	24.27 29.59 42.98 55.78	6.19
Laboratory No. 17936; through $\frac{1}{2}$ -inch over $\frac{1}{2}$ -inch screen.....	1.35 1.45 1.55 1.65	86 92 96 98	14 8 4 2	3.40 3.95 4.73 5.12	26.76 35.81 51.07 63.98	
Laboratory No. 17942; through $\frac{1}{2}$ -inch on $\frac{1}{2}$ -inch screen.....	1.35 1.45 1.55 1.65	86 95 97 98	10 5 3 2	2.94 3.39 3.88 4.15	28.71 39.93 53.77 67.86	
Laboratory No. 17948; through $\frac{1}{2}$ -inch on 10-mesh screen.....	1.35 1.45 1.55 1.65	86 97 98 98	4 3 2 2	2.42 2.51 2.72 2.87	37.86 45.82 60.96 72.31	
Laboratory No. 17964; through 10-mesh on 60-mesh.....	1.35 1.45 1.55 1.65	86 93 96 97 98	7 4 3 2 2	1.88 2.01 2.18 2.30	33.69 48.02 61.67 71.61	4.67

December 26, 1912.

[By A. C. Fieldner, chemist.]

INCLOSURE L1.

Laboratory No. 18312. Can No. 58860.

Sample of Bering River coal.

Remarks: Can received with top off, contents in mail bag; screened through $\frac{1}{2}$ -inch on $\frac{1}{2}$ -inch screen; float on 1.65 specific gravity; sent from United States Naval Engineering Experiment Station.

Net weight, 1,097.2 grams.

Date of sampling, December 12, 1912. Date of laboratory sampling, December 22, 1912. Date of analysis, December 29, 1912.

For Bureau of Mines section, Navy Department.

Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 1.4.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.54	1.94	.....	.....
Volatile matter.....	18.06	17.81	18.16	19.17
Fixed carbon.....	76.15	75.07	76.56	80.83
Ash.....	5.25	5.18	5.28	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.29	4.39	4.25	4.49
Carbon.....	85.04	83.94	85.50	90.26
Nitrogen.....	1.80	1.77	1.81	1.91
Oxygen.....	2.88	4.09	2.42	2.86
Sulphur.....	.74	.73	.74	.78
Ash.....	5.25	5.18	5.28	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,199	8,083	8,243	8,702
B. t. u.....	14,768	14,549	14,837	15,064
Calorific value calculated from ultimate analysis:				
Calories.....	.....	8,128	.....	.....
B. t. u.....	.....	14,629	.....	.....

Fusing temperature of ash (reducing atmosphere): 1,340° C.—2,444° F.

January 19, 1914.

INCLOSURE L2.

Laboratory No. 18312. Can No. 55430.
 Sample of Bering River coal.
 Remarks: Screened through $\frac{1}{8}$ -inch on $\frac{1}{8}$ -inch screen; sink on 1.65 specific gravity; sent from United States Naval Engineering Experiment Station.
 Net weight, 861.7 grams.
 Date of sampling December 12, 1913. Date of laboratory sampling, December 22, 1913. Date of analysis, December 30, 1913.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kirkald.

[Air-dry loss, 0.3.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.97	1.24	.....	.....
Volatile matter.....	11.13	11.10	11.24	46.83
Fixed carbon.....	12.65	12.61	12.76	53.17
Ash.....	75.25	75.05	75.00	.....
	100.00	100.00	100.00	100.00

January 12, 1914.

INCLOSURE L3.

Laboratory No., 18302. Can No., 58845.
 Sample of Bering River raw coal.
 Remarks: Screened through $\frac{1}{8}$ -inch on $\frac{1}{8}$ -inch screen; sent from United States naval engineering experiment station.
 Net weight, 1,213.8 grams.
 Date of sampling, December 10, 1913. Date of laboratory sampling, December 20, 1913. Date of analysis, December 23, 1913.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kirkald.

Air-dry loss.	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.78	1.14	.....	.....
Volatile matter.....	17.22	17.16	17.36	19.46
Fixed carbon.....	71.27	71.01	71.83	80.84
Ash.....	10.73	10.69	10.81	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.14	4.17	4.09	4.59
Carbon.....	80.00	79.71	80.63	90.40
Nitrogen.....	1.76	1.74	1.76	1.97
Oxygen.....	2.68	2.99	2.00	2.24
Sulphur.....	.70	.70	.71	.80
Ash.....	10.73	10.69	10.81	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	7,696	7,668	7,758	8,696
B. t. u.....	13,863	13,803	13,961	15,653
Calorific value calculated from ultimate analysis:				
Calories.....		7,766	.....	.....
B. t. u.....		13,979	.....	.....

Fusing temperature of ash (in reducing atmosphere), 1,291° C.—2,356° F.
 January 19, 1914.

INCLOSURE L4.

Laboratory No. 18308. Can No. 58846.
 Sample of Bering River washed coal.
 Remarks: Screened through $\frac{1}{8}$ -inch on $\frac{1}{8}$ -inch screen; sent from United States Naval Engineering Experiment Station.
 Net weight, 1,163.7 grams.
 Date of sampling December 11, 1913. Date of laboratory sampling, December 23, 1913. Date of analysis, December 27, 1913.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 1.7.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.44	2.17	.....	.....
Volatile matter.....	18.56	18.24	18.64	19.78
Fixed carbon.....	75.25	73.94	75.86	80.23
Ash.....	5.75	5.65	5.78	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.58	4.60	4.55	4.53
Carbon.....	84.85	83.87	85.22	90.44
Nitrogen.....	1.79	1.76	1.80	1.91
Oxygen.....	2.28	3.79	1.89	2.01
Sulphur.....	.75	.74	.76	.81
Ash.....	5.75	5.65	5.78	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,162	8,020	8,198	8,701
B. t. u.....	14,692	14,436	14,756	15,663
Calorific value calculated from ultimate analysis:				
Calories.....		8,207	.....	.....
B. t. u.....		14,773	.....	.....

Fusing temperature of ash (reducing atmosphere) 1,328° C.=2,422° F.
 January 19, 1914.

INCLOSURE L5.

Laboratory No. 18304. Can No. 58851.
 Sample of Bering River refuse coal.
 Remarks: Screened through $\frac{1}{8}$ inch on $\frac{1}{8}$ inch screen; sent from United States Naval Engineering Experiment Station.
 Net weight, 1431 grams.
 Date of sampling, December 11, 1913. Date of laboratory sampling, December 23, 1913. Date of analysis, January 3, 1914.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss 2.1.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.88	2.91	.....	.....
Volatile matter.....	14.62	14.32	14.75	25.27
Fixed carbon.....	43.22	42.94	43.61	74.73
Ash.....	41.28	40.43	41.64	.....
	100.00	100.00	100.00	100.00

January 13, 1914.

INCLOSURE L6.

Laboratory No. 18310. Can No. 55429.
 Sample of Bering River coal.
 Remarks: Screened through one-half inch on 4-mesh screen; 1.65 specific gravity float; sent from United States Naval Engineering Experiment Station.
 Net weight, 1,083.5 grams.
 Date of sampling, December 12, 1913. Date of laboratory sampling, December 23, 1913. Date of analysis, December 29, 1913.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 3.6.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture	0.85	4.39		
Volatile matter	18.85	18.26	17.00	17.78
Fixed carbon	77.95	75.17	78.62	82.22
Ash	4.35	4.19	4.38	
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen	4.39	4.63	4.33	4.53
Carbon	86.07	83.00	86.81	90.79
Nitrogen	1.90	1.83	1.91	2.00
Oxygen	2.58	5.67	1.86	1.94
Sulphur	.71	.68	.71	.74
Ash	4.35	4.19	4.38	
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories	8,304	8,008	8,378	8,760
B. t. u.	14,947	14,414	15,077	15,768
Calorific value calculated from ultimate analysis:				
Calories		8,073		
B. t. u.		14,531		

Fusing temperature of ash (in reducing atmosphere): 1,365° C.—2,489° F.
 January 19, 1914.

INCLOSURE L7.

Laboratory No. 18311. Can No. 55431.
 Sample of Bering River coal.
 Remarks: Screened through one-half inch on 4-mesh screen; sink on 1.65 specific gravity; sent from United States Naval Engineer Experiment Station.
 Net weight, 1,100.2 grams.
 Date of sampling, December 12, 1913. Date of laboratory sampling, December 23, 1913. Date of analysis, December 31, 1913.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 1.8.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture	1.15	2.97		
Volatile matter	10.95	10.75	11.08	48.48
Fixed carbon	14.23	13.97	14.40	56.53
Ash	73.67	72.31	74.52	
	100.00	100.00	100.00	100.00

January 13, 1914.

INCLOSURE L8.

Laboratory No. 18298. Can No. 55423.
 Sample of Bering River raw coal.
 Remarks: Screened through $\frac{1}{2}$ inch on 4-mesh; sent from United States Naval Engineering Experiment Station.
 Net weight, 1,289.5 grams.
 Date of sampling, December 10, 1913. Date of laboratory sampling, December 20, 1913. Date of analysis, December 22, 1913.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 0.4.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.60	1.01	.....	.....
Volatile matter.....	17.15	17.08	17.26	19.89
Fixed carbon.....	69.45	69.16	69.87	80.20
Ash.....	12.80	12.75	12.88	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.02	4.05	3.98	4.57
Carbon.....	77.54	77.22	78.01	89.54
Nitrogen.....	1.73	1.72	1.74	2.00
Oxygen.....	3.23	3.58	2.70	3.10
Sulphur.....	.68	.68	.69	.79
Ash.....	12.80	12.75	12.88	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	7,469	7,438	7,514	8,625
B. t. u.....	13,444	13,388	13,526	15,525
Calorific value calculated from ultimate analysis:				
Calories.....		7,465	.....	.....
B. t. u.....		13,491	.....	.....

Fusing temperature of ash (in reducing atmosphere): 1,291° C.—2,356° F.

January 19, 1914.

INCLOSURE L9.

Laboratory No. 18297. Can No. 58237.
 Sample of Bering River washed coal.
 Remarks: Screened through $\frac{1}{2}$ inch on 4 mesh; sent from United States Naval Engineering Experiment Station.
 Net weight, 1216.8 grams.
 Date of sampling, December 10, 1913. Date of laboratory sampling, December 22, 1913. Date of analysis, December 26, 1913.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 3.0.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.53	3.54	.....	.....
Volatile matter.....	17.62	17.09	17.72	19.01
Fixed carbon.....	75.10	72.82	75.49	80.99
Ash.....	6.75	6.55	6.79	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.17	4.38	4.14	4.44
Carbon.....	83.54	81.01	83.98	90.09
Nitrogen.....	1.75	1.70	1.76	1.89
Oxygen.....	3.11	5.70	2.65	2.85
Sulphur.....	.68	.66	.68	.73
Ash.....	6.75	6.55	6.79	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,045	7,801	8,067	8,678
B. t. u.....	14,481	14,042	14,557	15,617
Calorific value calculated from ultimate analysis:				
Calories.....		7,825	.....	.....
B. t. u.....		14,065	.....	.....

Fusing temperature of ash (in reducing atmosphere): 1,295° C.—2,363° F.

January 19, 1914.

INCLOSURE L10.

Laboratory No. 18301. Can No. 53552.

Sample of Bering River refuse coal.

Remarks: Screened through one-half inch on 4-mesh; sent from United States Naval Engineering Experiment Station.

Net weight, 1,292.9 grams.

Date of sampling, December 10, 1913. Date of laboratory sampling, December 23, 1913. Date of analysis, December 30, 1913.

For Bureau of Mines section, Navy Department.

Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 3.2.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.64	3.81	.....	.....
Volatile matter.....	15.01	14.53	15.11	21.12
Fixed carbon.....	66.07	54.28	56.43	78.88
Ash.....	23.28	27.38	28.46	.....
	100.00	100.00	100.00	100.00

January 13, 1914.

INCLOSURE L11.

Laboratory No. 18308. Can No. 55450.

Sample of Bering River coal.

Remarks: Screened through 4-mesh on 10-mesh screen; 1.65 specific gravity float; sent from United States Naval Engineering Experiment Station.

Net weight, 1,113.2 grams.

Date of sampling, December 12, 1913. Date of laboratory sampling, December 23, 1913. Date of analysis, December 29, 1913.

For Bureau of Mines section, Navy Department.

Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 5.3.]

	Air dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.83	6.53	.....	.....
Volatile matter.....	19.07	17.97	19.23	20.24
Fixed carbon.....	75.25	70.93	75.88	79.78
Ash.....	4.85	4.57	4.89	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.30	4.69	4.24	4.46
Carbon.....	85.11	80.22	85.83	90.24
Nitrogen.....	1.81	1.71	1.93	1.92
Oxygen.....	3.26	8.18	2.54	2.68
Sulphur.....	.67	.63	.67	.70
Ash.....	4.85	4.57	4.89	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,206	7,734	8,275	8,700
B. t. u.....	14,771	13,921	14,896	15,699
Calorific value calculated from ultimate analysis:				
Calories.....		7,761	.....	.....
B. t. u.....		13,970	.....	.....

Fusing temperature of ash (reducing atmosphere): 1,340° C.—2,444° F.

January 19, 1914.

INCLOSURE L12.

Laboratory No. 18309. Can No. 55481.
 Sample of Bering River coal.
 Remarks: Screened through 4-mesh on 10-mesh screen; 1.65 specific gravity sink; sent from United States Naval Engineer Experiment Station.
 Net weight, 1,593.2 grams.
 Date of sampling December 12, 1913. Date of laboratory sampling, December 24, 1913. Date of analysis, December 31, 1913.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

(Air-dry loss 8.4.)

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	1.23	9.57	.....	.....
Volatile matter.....	11.00	10.07	11.14	39.87
Fixed carbon.....	16.59	15.19	16.80	60.13
Ash.....	71.18	65.17	72.06	.....
	100.00	100.00	100.00	100.00

January 13, 1914.

INCLOSURE L13.

Laboratory No. 18296. Can No. 55388.
 Sample of Bering River raw coal.
 Remarks: Can received with cover off, contents in mail bag; screened through 4-mesh on 10-mesh; sent from United States Naval Engineering Experiment Station.
 Net weight, 1,163.9 grams.
 Date of sampling, December 10, 1913. Date of laboratory sampling, December 20, 1913. Date of analysis, December 22, 1913.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

(Air-dry loss, 0.3.)

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.73	1.07	.....	.....
Volatile matter.....	16.52	16.46	16.64	30.40
Fixed carbon.....	64.46	64.24	64.93	79.00
Ash.....	18.29	18.23	18.43	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	3.69	3.72	3.64	4.46
Carbon.....	72.06	71.81	72.59	88.09
Nitrogen.....	1.44	1.44	1.46	1.79
Oxygen.....	3.87	4.15	3.22	3.95
Sulphur.....	.65	.65	.66	.81
Ash.....	18.29	18.23	18.43	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	6,898	6,875	6,949	8,519
B. t. u.....	12,416	12,375	12,508	15,334
Calorific value calculated from ultimate analysis:				
Calories.....	.....	6,920	.....	.....
B. t. u.....	.....	12,456	.....	.....

Fusing temperature of ash (in reducing atmosphere), 1,300° C. = 2,372° F.

January 19, 1914.

INCLOSURE L14.

Laboratory No. 18300. Can No. 55397.

Sample of Bering River washed coal.

Remarks: Screened through 4-mesh on 10-mesh; sent from United States Naval Engineering Experiment Station.

Net weight, 1,153.9 grams.

Date of sampling, December 10, 1913. Date of laboratory sampling, December 20, 1913. Date of analysis, December 24, 1913.

For Bureau of Mines section, Navy Department.

Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 8.1.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.64	8.65	.....	.....
Volatile matter.....	18.21	16.74	18.33	20.75
Fixed carbon.....	69.57	63.96	70.01	79.25
Ash.....	11.58	10.65	11.66	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	3.76	4.36	3.72	4.21
Carbon.....	78.66	72.32	79.17	89.62
Nitrogen.....	1.75	1.61	1.76	1.99
Oxygen.....	3.58	10.44	3.01	3.41
Sulphur.....	.67	.62	.68	.77
Ash.....	11.58	10.65	11.66	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	7,564	6,954	7,613	8,618
B. t. u.....	13,615	12,517	13,703	16,612
Calorific value calculated from ultimate analysis:				
Calories.....		6,908	.....	.....
B. t. u.....		12,434	.....	.....

Fusing temperature of ash (in reducing atmosphere): 1,334° C.—2,433° F.

January 19, 1914.

INCLOSURE L15.

Laboratory No. 18299. Can No. 55408.

Sample of Bering River refuse coal.

Remarks: Screened through 4-mesh on 10-mesh; sent from United States Naval Engineering Experiment Station.

Net weight, 1,343.6 grams.

Date of sampling, December 10, 1913. Date of laboratory sampling, December 22, 1913. Date of analysis, December 30, 1913.

For Bureau of Mines section, Navy Department.

Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 5.8.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.79	6.58	.....	.....
Volatile matter.....	13.91	13.10	14.02	23.23
Fixed carbon.....	45.97	43.29	46.34	76.77
Ash.....	39.33	37.03	39.64	.....
	100.00	100.00	100.00	100.00

January 13, 1914.

INCLOSURE L16.

Laboratory No. 18306. Can No. 58968.
 Sample of Bering River washed coal.
 Remarks: Mixture from refuse pile; sent from United States Naval Engineering Experiment Station.
 Net weight, 1,100.9 grams.
 Date of sampling, December 11, 1913. Date of laboratory sampling, December 23, 1913. Date of analysis, December 29, 1913.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 3.1.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.80	3.86	.....	.....
Volatile matter.....	17.40	16.86	17.54	19.06
Fixed carbon.....	72.90	71.03	74.40	80.94
Ash.....	7.90	7.66	7.97	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.10	4.31	4.04	4.29
Carbon.....	82.03	79.50	82.69	89.86
Nitrogen.....	1.72	1.67	1.74	1.89
Oxygen.....	8.55	6.18	2.85	3.10
Sulphur.....	.70	.68	.71	.77
Ash.....	7.90	7.66	7.97	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	7,933	7,689	7,967	8,089
B. t. u.....	14,279	13,840	14,365	15,643
Calorific value calculated from ultimate analysis:				
Calories.....	.....	7,659	.....	.....
B. t. u.....	.....	13,786	.....	.....

Fusing temperature of ash (reducing atmosphere): 1,322° C. = 2,412° F.
 January 19, 1914.

INCLOSURE L17.

Laboratory No. 18307. Can No. 58973.
 Sample of Bering River refuse coal.
 Remarks: Mixture from refuse pile; sent from United States Naval Engineering Experiment Station.
 Net weight, 1,574.8 grams.
 Date of sampling, December 11, 1913. Date of laboratory sampling, December 23, 1913. Date of analysis, December 30, 1913.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 4.0.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	1.10	5.09	.....	.....
Volatile matter.....	12.53	12.03	12.67	25.70
Fixed carbon.....	31.12	29.86	31.47	71.30
Ash.....	55.25	53.02	55.86	.....
	100.00	100.00	100.00	100.00

January 13, 1914.

INCLOSURE L18.

Laboratory No. 18306. Can No. 55428.
 Sample of Bering River hutch refuse coal.
 Remarks: Received in can with cover off, but coal remained; sent from United States Naval Engineering Experiment Station.
 Net weight, 1,736.5 grams.
 Date of sampling, December 11, 1913. Date of laboratory sampling, December 27, 1913. Date of analysis, December 31, 1913.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kirkald.

[Air-dry loss, 20.8.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture	0.85	21.48		
Volatile matter	14.76	11.68	14.88	21.44
Fixed carbon	54.07	42.82	54.53	78.56
Ash	30.33	24.02	30.59	
	100.00	100.00	100.00	100.00

January 13, 1914.

INCLOSURE M.

TABLE II.—Bering River, Alaska, coal, coal analyses, dry basis, samples from washing operations.

[Test 302. L. L.]

Inclosure No.....	L1	L2	L3	L4	L5
Bureau of Mines Laboratory No.....	18312	18313	18302	18303	18304
Screensed size.....	$\frac{1}{2}$ inch.	$\frac{1}{2}$ inch.	$\frac{1}{2}$ inch.	$\frac{3}{4}$ inch.	$\frac{1}{2}$ inch.
Character of sample.....	{ Float on 1.65 sp. gr.	{ Sink on 1.65 sp. gr.	{ Raw coal.	{ Washed coal.	{ Refuse.
Proximate analysis:					
Volatile matter	18.16	11.24	17.36	18.64	14.76
Fixed carbon	76.56	12.76	71.83	75.58	43.61
Ash	5.28	76.00	10.81	5.78	41.64
	100.00	100.00	100.00	100.00	100.00
Ultimate analysis:					
Hydrogen	4.25		4.09	4.55	
Carbon	85.50		80.63	85.22	
Nitrogen	1.81		1.76	1.80	
Oxygen	2.42		2.00	1.89	
Sulphur	.74		.71	.76	
Ash	5.28		10.81	5.78	
	100.00		100.00	100.00	
B. t. u.	14,837		13,961	14,756	
Fusing temperature, ° F.	2,444		2,356	2,422	
B. t. u. ash and moisture free.....	15,664		15,653	15,662	

TABLE II.—*Bering River, Alaska, coal, coal analyses, dry basis, samples from washing operations—Continued.*

Inclosure No.....	L6	L7	L8	L9	L10
Bureau of Mines Laboratory No.....	18310	18311	18296	18297	18301
Screened size.....	{ ½ inch, mesh.	{ ½ inch, mesh.	{ ½ inch, mesh.	{ ½ inch, mesh.	{ ½ inch, mesh.
Character of sample.....	{ Float on 1.65 sp. gr.	{ Sink on 1.65 sp. gr.	{ Raw coal.		{ Washed coal. } Refuse.
Proximate analysis:					
Volatile matter.....	17.00	11.06	17.25	17.72	15.11
Fixed carbon.....	78.62	14.40	60.87	75.49	56.43
Ash.....	4.38	74.52	12.88	6.79	28.46
	100.00	100.00	100.00	100.00	100.00
Ultimate analysis:					
Hydrogen.....	4.23		2.96	4.14	
Carbon.....	86.81		78.01	83.96	
Nitrogen.....	1.91		1.74	1.76	
Oxygen.....	1.86		2.70	2.65	
Sulphur.....	.71		.69	.68	
Ash.....	4.38		12.88	6.79	
	100.00		100.00	100.00	
B. t. u.....	15,077		13,525	14,557	
Fusing temperature, °F.....	2,489		2,356	2,363	
B. t. u. ash and moisture free.....	15,768		15,525	15,617	
Inclosure No.....	L11	L12	L13	L14	L15
Bureau of mines Laboratory No.....	18308	18309	18296	18300	18299
Screened rise.....	4-10 mesh.	4-10 mesh.	4-10 mesh.	4-10 mesh.	4-10 mesh.
Character of sample.....	{ Float on 1.65 sp. gr.	{ Sink on 1.65 sp. gr.	{ Raw coal.		{ Washed coal. } Refuse.
Proximate analysis:					
Volatile matter.....	19.23	11.14	16.64	18.33	14.02
Fixed carbon.....	75.88	16.80	64.93	70.01	46.34
Ash.....	4.89	72.06	18.43	11.66	39.64
	100.00	100.00	100.00	100.00	100.00
Ultimate analysis:					
Hydrogen.....	4.24		3.64	3.72	
Carbon.....	85.83		72.59	79.17	
Nitrogen.....	1.83		1.46	1.76	
Oxygen.....	2.54		3.22	3.01	
Sulphur.....	.67		.66	.68	
Ash.....	4.89		18.43	11.66	
	100.00		100.00	100.00	
B. t. u.....	14,895		12,508	13,703	
Fusing temperature, °F.....	2,444		2,372	2,433	
B. t. u. ash and moisture free.....	15,660		15,334	15,512	

TABLE II.—Bering River, Alaska, coal, coal analyses, dry basis, samples from washing operations—Continued.

Inclosure No.....	L16	L17	L18
Bureau of Mines Laboratory No.....	18306	18307	18308
Screened size.....	Mixed.	Mixed.	Hutch refuse.
Character of sample.....	Rewashed refuse pile.	Refuse of L16.	Hutch refuse.
Proximate analysis:			
Volatile matter.....	17.54	12.67	14.86
Fixed carbon.....	74.49	81.47	54.53
Ash.....	7.97	55.86	30.59
	100.00	100.00	100.00
Ultimate analysis:			
Hydrogen.....	4.04		
Carbon.....	82.69		
Nitrogen.....	1.74		
Oxygen.....	2.85		
Sulphur.....	.71		
Ash.....	7.97		
	100.00		
B. t. u.....	14,395		
Fusling temperature, °F.....	7,412		
B. t. u. ash and moisture free.....	15,642		

INCLOSURE N.

TABLE III.—Data and results of washery operations.

	Size of coal.			
	1-1/2 inch.	1/2 inch-4 mesh.	4-10 mesh.	Refuse.
Speed of plunger, revolutions per minute.....	103	106-123	107	102
Length of plunger stroke, inches.....	1	2	2	2
Time of washing, hours.....	3.55	3.57	4.25	.....
Weight of raw coal fed, pounds.....	11,559	14,170	15,646	3,623
Coal washed per hour, pounds.....	3,257	3,969	3,681	.....
Weight of washed coal, pounds.....	10,029	10,557	12,589	1,850
Weight of refuse removed, pounds.....	1,650	3,762	3,672	1,852
Moisture in raw coal, per cent.....	1.14	1.01	1.07	3.36
Moisture in washed coal, per cent.....	2.17	3.54	8.65	3.86
Moisture in refuse, per cent.....	2.91	3.81	6.58	5.09
Total weight of dry coal and refuse:				
Weight of raw coal, pounds.....	11,427	14,027	15,479	3,501
Weight of washed coal, pounds.....	9,811	10,183	12,413	1,759
Weight of refuse, pounds.....	1,602	3,619	3,430	1,758
Unaccounted for as refuse.....	14	225	-364	-16
Float and sink tests on 1.65 specific gravity:				
Raw coal, float, per cent.....	90.8	87.8	79.8	46.5
Raw coal, sink, per cent.....	9.2	12.2	20.2	53.5
Washed coal, float, per cent.....	95.9	94.7	91.8	95.8
Washed coal, sink, per cent.....	4.1	5.3	8.7	4.2
Refuse, float, per cent.....	41.8	51.2	47.7	22.0
Refuse, sink, per cent.....	58.2	48.8	52.3	78.0
Analyses of ash in dry coal:				
Float on 1.65 specific gravity, per cent.....	5.28	4.38	4.89	.....
Sink on 1.65 specific gravity, per cent.....	76.00	74.52	72.06	.....
Raw coal, per cent.....	10.81	12.88	18.43	35.05
Washed coal, per cent.....	5.78	6.79	11.66	7.97
Refuse, per cent.....	41.04	28.46	39.64	55.86
Deducted results:				
Ash reduction, per cent.....	46.50	47.28	36.72	77.28
Washed coal by weight, per cent.....	85.86	72.59	80.20	50.24
Refuse by weight, per cent.....	14.14	27.41	19.80	49.76
Washed coal by analysis, per cent.....	85.97	71.90	75.80	43.45
Refuse by analysis, per cent.....	14.03	28.10	24.20	56.55
Ash removed, per cent.....	54.02	62.06	62.04	90.13
Dry ash in raw coal, calculated per cent.....	11.79	12.94	18.45	.....

INCLOSURE O.

TABLE IV.—Table of data and results of evaporative test, Pocahontas and Bering River (Alaska) coals.

	Pocahontas.	Bering River.
GENERAL.		
Run No.....	1	2
Date.....	(1)	(2)
Duration, hours.....	24	24
AVERAGE PRESSURES.		
Barometer, inches of mercury.....	29.99	29.82
Barometer, pounds per square inch.....	14.74	14.66
Steam, pounds per square inch, gauge.....	300.2	298.0
Steam, pounds per square inch, absolute.....	314.9	312.7
Draft, ash pit, inches of water.....	0.000	0.000
Draft, furnace, inches of water.....	.325	.423
Draft, base of stack, inches of water.....	.750	.748
AVERAGE TEMPERATURES, DEGREES FAHRENHEIT.		
External air.....	45.8	45.4
Fire room.....	62.5	62.5
Steam by thermometer.....	421.0	421.4
Steam from pressure.....	421.9	420.9
Feed water entering boiler.....	183.9	188.1
Gases in furnace.....	1,836	1,566
Gases at base of stack.....	744	674
Gases at base of stack by thermometer.....	764	698
WEATHER AND HUMIDITY.		
State of weather.....	(3)	(3)
Wind direction.....	(3)	(3)
Wind velocity, miles per hour.....	2.3	6.7
Wet-bulb thermometer, degrees Fahrenheit.....	52.0	52.6
Dew point by hygrometer, degrees Fahrenheit.....	41.2	39.5
Relative humidity from wet bulb.....	47.1	50.0
Relative humidity from hygrometer.....	47.6	44.7
Average relative humidity.....	47.4	47.4
Moisture per cubic foot of air, pounds.....	0.0042	0.0043
Dry air per cubic foot of air, pounds.....	0.07563	0.07607
TOTAL FUEL.		
Trade name.....	(7)	(7)
Size of coal.....	(9)	(10)
Coal as fired, pounds.....	35,740	27,160
Moisture by analysis, per cent.....	2.37	1.58
Dry coal consumed, pounds.....	34,863	26,731
Dry ash from ash pit, pounds.....	1,790	908
Dry clinker from grate, pounds.....	739	1,267
Dry clinker from bridge wall, pounds.....	187	16
Dry soot from tubes and baffles, pounds.....	35	36
Total dry ash, clinker and soot, pounds.....	2,741	2,223
Combustible consumed, pounds.....	32,152	24,508
Ashes and clinker in dry coal, per cent.....	7.76	8.20
PROXIMATE ANALYSIS OF COAL AS FIRED.		
Moisture, per cent.....	2.37	1.58
Volatile matter, per cent.....	21.01	17.25
Fixed carbon, per cent.....	71.10	75.83
Ash, per cent.....	5.52	8.24
Sulphur (separately determined), per cent.....	.78	.72
ULTIMATE ANALYSIS OF DRY COAL.		
Carbon, per cent.....	84.95	85.90
Hydrogen, per cent.....	4.43	4.30
Oxygen, per cent.....	2.94	1.85
Nitrogen, per cent.....	1.18	1.80
Sulphur, per cent.....	.79	.73
Ash, per cent.....	5.66	5.42
Moisture in coal as received, associated with dry coal, per cent.....	2.43	1.61

1 Dec. 16, 17 1913.

2 Dec. 17, 18, 1913.

3 Clear.

4 Partly cloudy to clear.

5 S. to SSW.

6 NNW. to WNW.

7 Pocahontas No. 1.

8 Bering River big vein.

9 Run of mine

10 Lump over 4-mesh.

TABLE IV.—Table of data and results of evaporative test, Pocahontas and Bering River (Alaska) coals—Continued.

	Pocahontas	Bering River
ULTIMATE ANALYSIS OF COAL, ASH, AND MOISTURE FREE.		
Carbon, per cent.....	90.04	90.82
Hydrogen, per cent.....	4.75	4.55
Oxygen, per cent.....	3.12	1.95
Nitrogen, per cent.....	1.25	1.21
Sulphur per cent.....	.84	.77
ANALYSIS OF ASHES FROM ASH PTT.		
Carbon, per cent.....	59.90	46.06
Ash, per cent.....	40.10	53.94
ANALYSIS OF CLINKER FROM GRATE.		
Carbon, per cent.....	12.51	19.37
Ash, per cent.....	87.49	80.63
ANALYSIS OF CLINKER FROM BRIDGE WALL.		
Carbon, per cent.....	8.90	.88
Ash, per cent.....	91.10	99.12
ANALYSIS OF SOOT FROM TUBES AND BAFFLE WALLS.		
Carbon, per cent.....	46.47	48.80
Ash, per cent.....	53.53	51.11
CALORIFIC VALUES.		
Dry coal by calorimeter, B. t. u. per pound.....	14,786	14,844
Coal, ash, and moisture free, by calorimeter.....	15,673	15,794
Dry coal from analysis, B. t. u. per pound.....	14,940	15,047
Coal, ash, and moisture free, from analysis.....	15,836	15,910
FUEL PER HOUR.		
Dry coal consumed, pounds.....	1,454	1,114
Combustible consumed, pounds.....	1,340	1,021
Dry coal per square foot of grate surface, pounds.....	24.95	19.11
Combustible per square foot of grate surface, pounds.....	22.99	17.51
STEAM QUALITY.		
Throttling calorimeter temperature, degrees Fahrenheit.....	323.1	322.5
Throttling calorimeter pressure, pounds gauge.....	11.50	11.32
Quality, per cent dry.....	99.38	99.41
Moisture in steam, per cent.....	0.62	0.59
Heat in dry saturated steam above feed temperature, B. t. u. per pound.....	1,052.9	1,048.4
Heat in wet steam above feed temperature, B. t. u. per pound.....	1,047.9	1,043.6
Factor of correction for steam quality.....	.9953	.9954
Factor of evaporation.....	1.0850	1.0804
TOTAL WATER.		
Water fed to boiler, pounds.....	324,355	242,906
Water evaporated, corrected for moisture, pounds.....	322,831	241,791
Equivalent evaporation from and at 212° F., pounds.....	350,272	261,231
WATER PER HOUR.		
Water evaporated corrected for moisture, pounds.....	13,451	10,075
Equivalent evaporation, from and at 212° F., pounds.....	14,595	10,885
Equivalent evaporation, from and at 212° F., per square foot of water-heating surface, pounds.....	6.75	5.04
CAPACITY.		
Boiler horsepower developed.....	422.9	315.5
Rated boiler horsepower.....	216.1	216.1
Proportion of rated capacity attained, per cent.....	195.7	146.1
ECONOMIC RESULTS.		
Water fed per pound of coal fired, pounds.....	9.08	8.94
Equivalent dry saturated steam evaporated per pound dry coal pounds.....	9.25	9.05
Equivalent evaporated from and at 212° F. per pound of coal fired, pounds.....	9.80	9.62
Equivalent evaporated from and at 212° F. per pound of dry coal, pounds.....	10.04	9.77
Equivalent evaporated from and at 212° F. per pound of combustible, pounds.....	10.99	10.66

TABLE IV.—Table of data and results of evaporative test, Pocahontas and Bering River (Alaska) coals—Continued.

	Pocahontas.		Bering River.	
EFFICIENCY.				
Boiler, furnace, and grate, per cent.....	65.89		63.87	
Boiler and furnace, per cent.....	67.43		65.49	
Smoke by Ringelmann's smoke chart, per cent.....	59.4		27.4	
ANALYSIS OF DRY GASES, BY VOLUME.				
Carbon dioxide in first pass, per cent.....	12.80		10.06	
Oxygen in first pass, per cent.....	5.76		9.31	
Carbon monoxide in first pass, per cent.....	0.47		0.31	
Hydrogen and hydrocarbons in first pass, per cent.....	0.00		0.00	
Nitrogen in first pass (by difference), per cent.....	80.97		80.30	
Carbon dioxide at base of stack, per cent.....	12.74		10.97	
Oxygen at base of stack, per cent.....	5.45		8.15	
Carbon monoxide at base of stack, per cent.....	1.12		0.53	
Nitrogen at base of stack (by difference), per cent.....	80.69		80.35	
WATER IN ASH PIT.				
Put in ash pit per pound of dry coal, pounds.....	0.0462		.1454	
Accounted for in ashes by analysis, per pound of dry coal, pounds.....	0.0005		.0032	
Evaporated and in flue gases per pound of dry coal, pounds.....	0.0457		.1421	
AIR SUPPLY.				
Theoretical quantity per pound dry coal, pounds.....	10.817		11.081	
Quantity supplied per pound dry coal, pounds.....	14.656		18.102	
Excess air supplied, per cent.....	35.49		63.36	

	Pocahontas.		Bering River.	
	B. t. u.	Per cent.	B. t. u.	Per cent.
HEAT BALANCE BASED ON DRY COAL.				
Heat absorbed by boiler.....	9,743	65.89	9,481	63.87
Loss due to vaporization of moisture in coal.....	33	.22	22	.15
Loss due to vaporization of moisture formed from hydrogen in coal.....	555	3.75	521	3.51
Loss due to heat carried away in dry chimney gases.....	2,534	17.14	2,802	18.85
Loss due to formation of carbon monoxide.....	707	4.78	401	2.70
Loss due to combustible in ash and clinker.....	498	3.37	372	2.51
Loss due to heating moisture in air.....	26	.18	30	.20
Loss due to vaporization of moisture in ash pit.....	13	.43	191	1.29
Heat in clinker, radiation and unaccounted for.....	627	4.24	1,024	6.90
Heating value of 1 pound of dry coal.....	14,736	100.00	14,844	100.00
HEAT BALANCE BASED ON COMBUSTIBLE.				
Heat absorbed by boiler.....	10,568	67.43	10,344	65.49
Loss due to vaporization of moisture in coal.....	36	.23	24	.15
Loss due to vaporization of moisture formed from hydrogen in coal.....	602	3.84	568	3.60
Loss due to heat carried away in dry chimney gases.....	2,749	17.54	3,057	19.38
Loss due to formation of carbon monoxide.....	707	4.89	437	2.77
Loss due to heating moisture in air.....	28	.18	33	.20
Loss due to vaporization of moisture in ash pit.....	68	.43	208	1.32
Heat in radiation and unaccounted for.....	855	5.46	1,123	7.11
Heating value of 1 pound of combustible.....	15,673	100.00	15,794	100.00

INCLOSURE P1.

[A. C. Fieldner, chemist.]

Laboratory No. 18347. Can No. 58876.
 Test No. 362.
 Sample of Pocahontas run-of-mine coal.
 Remarks: Duplicate of laboratory No. 18348; sent from Naval Engineering Experiment Station.
 Gross weight, 6894 pounds. Net weight, 1,244.3 grams.
 Date of sampling, December 22, 1913. Date of laboratory sampling, December 31, 1913. Date of analysis, January 3, 1914.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 1.5.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.90	2.40	.....	.....
Volatile matter.....	21.35	21.03	21.55	22.85
Fixed carbon.....	72.12	71.03	72.77	77.15
Ash.....	5.63	5.54	5.68	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.57	4.67	4.51	4.78
Carbon.....	84.23	82.96	85.00	90.12
Nitrogen.....	1.29	1.27	1.30	1.38
Oxygen.....	3.46	4.75	2.68	2.84
Sulphur.....	.52	.81	.83	.88
Ash.....	5.63	5.54	5.68	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,146	8,023	8,220	8,715
B. t. u.....	14,663	14,441	14,796	15,687
Calorific value calculated from ultimate analysis:				
Calories.....		8,127	.....	.....
B. t. u.....		14,629	.....	.....

Fusing temperature of ash (in reducing atmosphere): 1,335° C.=2,435° F.

January 27, 1914.

INCLOSURE P2.

Laboratory No. 18348. Can No. 58871.
 Test No. 362.
 Sample of Pocahontas run-of-mine coal.
 Remarks: Duplicate of laboratory No. 18347; sent from Naval Engineering Experiment Station.
 Gross weight, 6894 pounds; net weight, 1,231.4 grams.
 Date of sampling, December 22, 1913. Date of laboratory sampling, December 31, 1913. Date of analysis, January 3, 1914.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 1.4.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.90	2.33	.....	.....
Volatile matter.....	21.30	20.99	21.49	22.77
Fixed carbon.....	72.22	71.18	72.88	77.23
Ash.....	5.58	5.50	5.63	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.51	4.61	4.45	4.72
Carbon.....	84.12	82.91	84.80	89.96
Nitrogen.....	1.06	1.04	1.06	1.12
Oxygen.....	3.98	5.20	3.21	3.39
Sulphur.....	.75	.74	.76	.81
Ash.....	5.58	5.50	5.63	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,134	8,017	8,209	8,699
B. t. u.....	14,641	14,431	14,776	15,658
Calorific value calculated from ultimate analysis:				
Calories.....		8,080	.....	.....
B. t. u.....		14,544	.....	.....

Fusing temperature of ash (in reducing atmosphere): 1,338° C.=2,440° F.

January 21, 1914.

INCLOSURE P3.

Laboratory No. 18351. Can No. 58241.

Test No. 362.

Sample of ashes.

Remarks: From test of Pocahontas coal sent from Naval Engineering Experiment Station.

Gross weight, 147 pounds. Net weight, 968.4 grams.

Date of sampling, December 22, 1913. Date of laboratory sampling, December 31, 1913. Date of analysis, January 5, 1914.

For Bureau of Mines section, Navy Department.

Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 0.7.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture	0.38	1.07	.....	.....
Volatile matter	5.02	4.99	5.04	8.41
Fixed carbon	54.65	54.27	54.86	91.59
Ash	39.96	39.67	40.10	.....
	100.00	100.00	100.00	100.00

January 12, 1914.

INCLOSURE P4.

Laboratory No. 18353. Can No. 58879.

Sample of clinker (from grate).

Remarks: From test of Pocahontas coal sent from Naval Engineering Experiment Station.

Gross weight, 75 pounds. Net weight, 1,410.5 grams.

Date of sampling, December 22, 1913. Date of laboratory sampling, January 2, 1914. Date of analysis, January 7, 1914.

For Bureau of Mines section, Navy Department.

Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 2.5.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture	0.05	2.51	.....	.....
Volatile matter	1.17	1.14	1.17	9.35
Fixed carbon	11.33	11.05	11.34	90.65
Ash	87.45	85.30	87.49	.....
	100.00	100.00	100.00	100.00

January 12, 1914.

INCLOSURE P5.

Laboratory No. 18356. Can No. 55396.

Test No. 362.

Sample of clinker (from bridge wall).

Remarks: From test of Bering River coal; sent from Naval Engineering Experiment Station.

Net weight, 581.4 grams.

Date of sampling, December 22, 1913. Date of laboratory sampling, December 31, 1913. Date of analysis, January 5, 1914.

For Bureau of Mines section, Navy Department.

Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 0.0.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture	0.15	0.13	.....	.....
Volatile matter	.88	.88	0.88	.....
Fixed carbon	99.00	99.02	99.15	.....
Ash .....	.....	.....	.....	.....
	100.03	100.03	100.03	.....

January 13, 1914.

INCLOSURE P6.

Laboratory No. 18357. Can No. 58242.
 Test No. 362.
 Sample of soot.
 Remarks: From tube and baffle test of Pocahontas coal; sent from Naval Engineering Experiment Station.
 Gross weight, 57 pounds. Net weight, 1,124.4 grams.
 Date of sampling, December 22, 1913. Date of laboratory sampling, January 5, 1914. Date of analysis, January 9, 1914.
 For Bureau of Mines section, Navy Department
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 37.3.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture	1.80	38.30	.....	.....
Volatile matter	8.88	5.57	9.03	19.43
Fixed carbon	36.84	23.10	37.44	80.57
Ash	52.68	33.03	53.53	.....
	100.00	100.00	100.00	100.00

January 13, 1914.

INCLOSURE P7.

Laboratory No. 18349. Can No. 58242.
 Test No. 362.
 Sample of Bering River screened and washed coal.
 Remarks: Duplicate of Laboratory No. 18350; sent from Naval Engineering Experiment Station.
 Gross weight, 7354 pounds. Net weight, 1,218.6 grams.
 Date of sampling, December 22, 1913. Date of laboratory sampling, December 31, 1913. Date of analysis, January 6, 1914.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 0.7.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture	0.83	1.56	.....	.....
Volatile matter	17.42	17.29	17.56	18.54
Fixed carbon	76.50	75.94	77.15	81.46
Ash	5.26	5.21	5.29	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen	4.34	4.39	4.29	4.53
Carbon	85.49	84.85	80.20	91.02
Nitrogen	1.78	1.77	1.80	1.90
Oxygen	2.41	3.05	1.69	1.78
Sulphur	.73	.72	.73	.77
Ash	5.26	5.21	5.29	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories	8,187	8,126	8,254	8,715
B. t. u.	14,737	14,627	14,857	15,687
Calorific value calculated from ultimate analysis:				
Calories		8,255	.....	.....
B. t. u.		14,859	.....	.....

Fusing temperature of ash (in reducing atmosphere): 1,390°C.=2,516°F.
 January 21, 1914.

INCLOSURE P8.

Laboratory No. 18350. Can No. 58837.

Test No. 362.

Sample of Bering River screened and washed coal.

Remarks: Duplicate of laboratory No. 18349 sent from Naval Engineering Experiment Station.

Gross weight, 735½ pounds. Net weight, 1,243.2 grams.

Date of sampling, December 22, 1913. Date of laboratory sampling, December 31, 1913. Date of analysis, January 6, 1914.

For Bureau of Mines section, Navy Department.

Collector, Capt. T. W. Kinkaid.

[Air-dry loss 0.8.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.80	1.60	.....	.....
Volatile matter.....	17.35	17.21	17.49	18.52
Fixed carbon.....	76.35	75.73	76.96	81.48
Ash.....	5.50	5.46	5.55	.....
	100.00	100.00	100.00	100.00
Ultimate analysis:				
Hydrogen.....	4.37	4.42	4.31	4.56
Carbon.....	84.91	84.22	85.59	90.62
Nitrogen.....	1.79	1.78	1.81	1.92
Oxygen.....	2.60	3.39	2.00	2.12
Sulphur.....	.74	.73	.74	.78
Ash.....	5.50	5.46	5.55	.....
	100.00	100.00	100.00	100.00
Calorific value determined:				
Calories.....	8,173	8,107	8,239	8,720
B. t. u.....	14,711	14,593	14,830	15,701
Calorific value calculated from ultimate analysis:				
Calories.....		8,200	.....	.....
B. t. u.....		14,760	.....	.....

Fusing temperature of ash (in reducing atmosphere): 1,353° C. = 2,467° F.
January 21, 1914.

INCLOSURE P9.

Laboratory No. 18352. Can No. 58844.

Test No. 362.

Sample of ashes.

Remarks: From test of Bering River coal; sent from Naval Engineering Experiment Station.

Gross weight, 95½ pounds. Net weight, 1,073.5 grams.

Date of sampling, December 22, 1913. Date of laboratory sampling, January 3, 1914. Date of analysis, January 7, 1914.

For Bureau of Mines section, Navy Department.

Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 9.0.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.85	9.28	.....	.....
Volatile matter.....	5.93	5.40	5.95	12.92
Fixed carbon.....	39.97	36.39	40.11	87.08
Ash.....	53.75	48.93	53.94	.....
	100.00	100.00	100.00	100.00

January 12, 1914.

INCLOSURE P10.

Laboratory No. 18354. Can No. 55427.
 Test No. 362.
 Sample of clinker (from grate).
 Remarks: From test of Bering River coal; sent from Naval Engineering Experiment Station.
 Gross weight, 138 pounds. Net weight, 1,358.7 grams.
 Date of sampling, December 22, 1913. Date of laboratory sampling, January 2, 1914. Date of analysis, January 7, 1914.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 4.7.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.13	4.82	.....	.....
Volatile matter.....	1.87	1.78	1.87	9.65
Fixed carbon.....	17.47	16.65	17.50	90.35
Ash.....	80.53	76.75	80.63	.....
	100.00	100.00	100.00	100.00

January 12, 1914.

INCLOSURE P11.

Laboratory No. 18355. Can No. 58880.
 Test No. 362.
 Sample of clinker (from bridge wall).
 Remarks: From test of Pocahontas coal; sent from Naval Engineering Experiment Station.
 Gross weight, 18 pounds. Net weight, 1,472.5 grams.
 Date of sampling, December 22, 1913. Date of laboratory sampling, December 31, 1913. Date of analysis, January 5, 1914.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 1.2.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.18	1.40	.....	.....
Volatile matter.....	.97	.96	.97	10.90
Fixed carbon.....	7.92	7.82	7.93	89.10
Ash.....	90.03	89.82	91.10	.....
	100.00	100.00	100.00	100.00

January 12, 1914.

INCLOSURE P12.

Laboratory No. 18358. Can No. 58861.
 Test No. 362.
 Sample of soot.
 Remarks: From tubes and baffle test of Bering River coal; sent from Naval Engineering Experiment Station.
 Gross weight, 33½ pounds. Net weight, 667.6 grams.
 Date of sampling, December 22, 1913. Date of laboratory sampling, December 31, 1913. Date of analysis, January 5, 1914.
 For Bureau of Mines section, Navy Department.
 Collector, Capt. T. W. Kinkaid.

[Air-dry loss, 0.3.]

	Air-dried.	As received.	Moisture free.	Moisture and ash free.
Proximate analysis:				
Moisture.....	0.90	1.23	.....	.....
Volatile matter.....	9.20	9.17	9.23	18.88
Fixed carbon.....	39.25	39.12	39.61	81.02
Ash.....	50.65	50.48	51.11	.....
	100.00	100.00	100.00	100.00

January 12, 1914.

FINDINGS, COMMENTS, AND OPINIONS OF THE NAVY DEPARTMENT.

The geological and mining conditions in the Bering River fields are unfavorable in that they oblige high mining costs. In general, the coal measures are much disturbed, the field having been subjected to intense dynamic stresses, resulting in folding, faulting of the strata, and crushing of the coal. It is the opinion of the best authorities that the mining conditions in the field are less favorable than those pertaining in the United States, with the exception of a certain area in the State of Washington. Added to this, and to the steep dips of the coal measures, is the necessity of expensive mine timbering, and of more than ordinary mine ventilation and drainage. Moreover, a very heavy rainfall, aside from its effect on general conditions, will result in very wet coal as delivered at the terminals. The latter can not be dismissed as a small matter; for a moisture content of 5 per cent in coal will result in a battleship loading 100 tons of water in her bunkering of 2,000 tons—a loss of one day's steaming at 12 knots and a consequent loss in cruising radius of 288 miles. This, of course, may and should be guarded against; but it means further additional increase in the already high mining and transportation costs noted below.

PRICE AT WHICH BERING RIVER COAL CAN BE LAID DOWN AT SAN FRANCISCO AND SEATTLE.

There exists a wide discrepancy between the Bureau of Mines' estimate of mining costs and the estimates of other mining engineers who have examined the field, the main differences being the large timbering charge in the former's estimate. At this time when there has been practically no mining in these fields, it is impossible to reconcile these differences of opinion; and hence the department will here quote the maximum and minimum estimates in order that some conclusion may be drawn from the most favorable and most unfavorable conditions:

	Maximum.				Minimum.			
	Bureau of Mines' mining cost estimates.		Mr. A. H. Storr's mining cost estimates.		Bureau of Mines' mining cost estimates.		Mr. A. H. Storr's mining cost estimates.	
	To Seattle.	To San Francisco.	To Seattle.	To San Francisco.	To Seattle.	To San Francisco.	To Seattle.	To San Francisco.
Mining costs.....	\$3.35	\$3.35	\$1.96	\$1.96	\$2.60	\$2.60	\$1.93	\$1.93
Haulage to Cordova, including wharfrage (Alaskan R.R. Commission).....	1.42	1.42	1.42	1.42	.95	.95	.95	.95
Ocean freights (Navy Department estimate).....	1.25	1.75	1.25	1.75	1.16	1.52	1.16	1.52
Unloading charge.....	.165	.165	.165	.165	.165	.165	.165	.165
Total.....	6.185	6.685	4.795	5.295	4.875	5.235	4.205	4.585

¹ Includes a charge of \$0.30 for washing; also charges for royalty and depreciation of plant.

² Includes charge for exhaustion of lands and charge for interest and depreciation, but does not include washing charge.

³ Does not include above.

NOTE.—The estimates for mining costs are for actual costs only and do not include a direct or indirect profit for the operator.

To afford a basis of comparison, a maximum and a minimum of Pocahontas cost at San Francisco is appended:

Item.	Maximum.	Minimum.
Pocahontas, f. o. b. Norfolk.....	\$3.00	\$3.00
Ocean freights.....	3.90	2.45
Unloading charge.....	.165	.165
Total.....	7.065	5.615

¹ Navy Department estimates. If interest and depreciation be omitted in this estimate (as it would should naval colliers be employed), the ocean freights would be \$2.57 and the total \$5.735 per ton.

² Prof. E. R. Johnson: Report of the Isthmian Canal Commission, S. Doc. 54, pt. 2, 1902. Appendix N. N., p. 349.

Of the above discrepancy, it may be said that the lowest estimate received from an eastern coal company for delivery of Pocahontas at San Francisco is \$6.87 per ton.

COMPARISON.

From the foregoing it can be seen that if the Navy Department's and the coal company's estimates of the price of Pocahontas at San Francisco be accepted, Bering River coal will in all cases undersell Pocahontas in the Pacific coast market; while if Prof. E. R. Johnson's estimate and the Navy Department's interest-and-depreciation-free estimates be accepted, Bering River coal will undersell Pocahontas in all cases except in the event that the first estimate, i. e., the Bureau of Mines maximum, proves to be the true one. It seems reasonable to the department that during the first few years of the construction and operation of the Alaskan railroad, and of the opening of the coal fields to development that the Bureau of Mines maximum estimate will probably obtain; nevertheless, the most probable Pocahontas rates indicate that Bering River coal will undersell Pocahontas. If an average be struck of all rates quoted above, it will appear that Bering River coal can be laid down at San Francisco for \$5.445, against \$6.34 Pocahontas. It can thus be seen that were Bering River coal suitable for naval use a saving of \$258,500 per year could be effected by its use, on an estimated annual need of 300,000 tons, and a vast strengthening of national security attained at the same time by the lessening of transportation difficulties in time of war.

RESULTS OF STEAMING TESTS.

It is with regret, then, that the department reports that the recent tests show conclusively that Bering River coal, mined from selected veins in one of the most promising portions of the field, is entirely unsuitable for naval use. Formerly the defect that gave the greatest concern was the general crushed condition of the coal, from which a large percentage of slack might be expected. An adequate percentage of lump was found, however, although it developed that much if not all of the slack must be washed, for it appears impossible for the miner to avoid knocking down the black shale bands with the coal, and the separation of these impurities from the coal is not practicable in any other way than by washing—which increases the cost of mining while not overcoming the inherent objections to slack coal.

The coal, however, failed on account of its property of forming large, tenacious clinker—probably the most serious defect that can be developed by a coal for marine use. Whether or not a nonclinking coal of good chemical and physical qualities exists in the field is an unsolved problem. The Bering River sample tried by the *Nebraska* in 1908 did not clinker at the low rate of combustion and consequent low furnace temperatures pertaining during that inconclusive trial. However, neither did the Bering River coal recently tested clinker under natural draft. Coal from that part of the field from which the *Nebraska* sample was mined is generally slack, and apparently not in this respect equal in physical qualities to the all-around satisfactory grade which it is hoped may be found.

GENERAL COMMENT AND RECOMMENDATIONS.

It thus appears that in a field like the Bering River, where in a comparatively small area anthracite, semianthracite, and semibituminous coals are found, and moreover where the measures have been so extensively disturbed, lack of uniformity in grade may be expected. It seems, therefore, that if coal suitable for naval use exists, it can not be spotted by chemical or physical excellence, but must be searched out by the laborious and expensive, but conclusive, methods of trial under service conditions.

The clinkering of coal is a subject on which but little of value is known from analysis. It varies with the type of grate, rate of combustion, depth of fire, and draft, so that the only positive guide as to its existence, nonexistence, or extent is a trial under the actual conditions under which the coal will be used. For this reason, the department would not regard a field test for clinkering—analyzing, taking temperatures of ash fusibility, tests in small grates or boilers—as information of any positive value. This procedure would be expensive and the results probably misleading. Now that the Alaskan railroads will be built, and a line extended into the Bering River fields, and the coal fields probably opened to leasing, the further test of coal from these fields for naval use should be resumed as soon as possible after the completion of the road, and after general development has set in in the coal fields, by the trial of large samples (cargoes) from various seams. In this manner only, in the department's opinion, can the existence of a satisfactory coal for naval use be ascertained.

CONCLUSION.

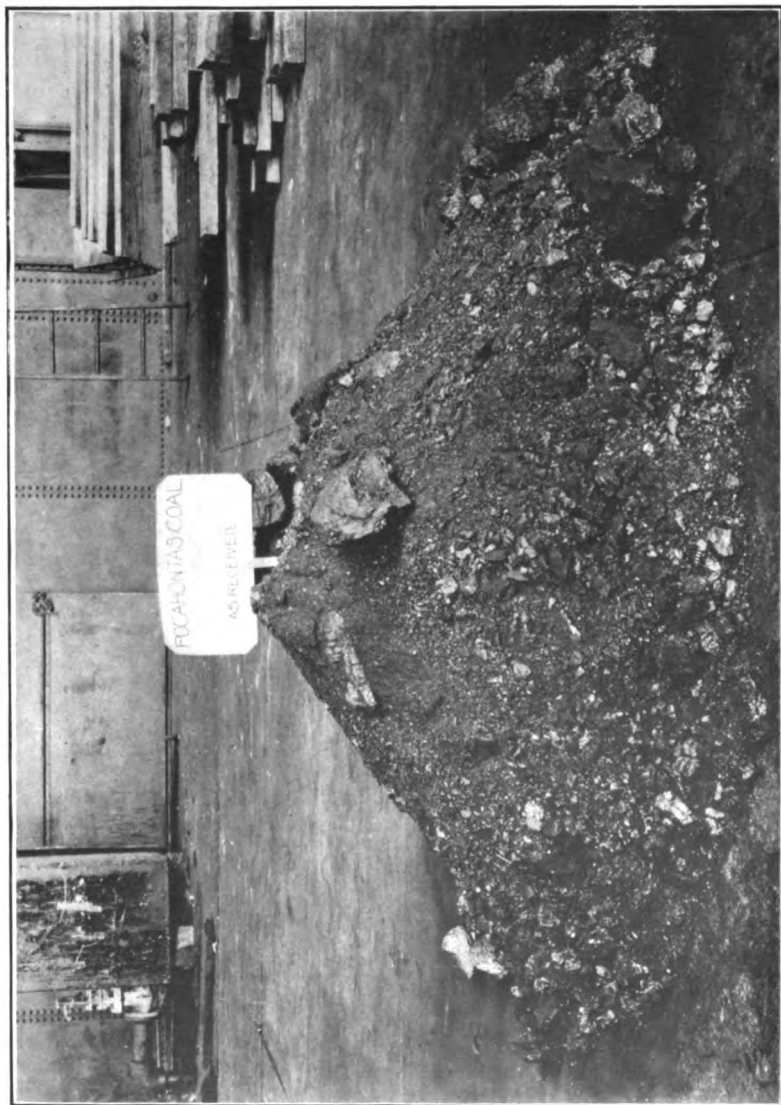
In conclusion, the failure on test of the excellent Bering River sample at the Engineering Experiment Station from severe and unusual clinkering—a sample better in all respects than the Pocahontas used in comparative test—obliges the department to regard and so report the Bering River field to be unavailable as a source of coal for the Navy until extensive general development definitely locates coal not possessing the serious objection found in the sample tested by the department.





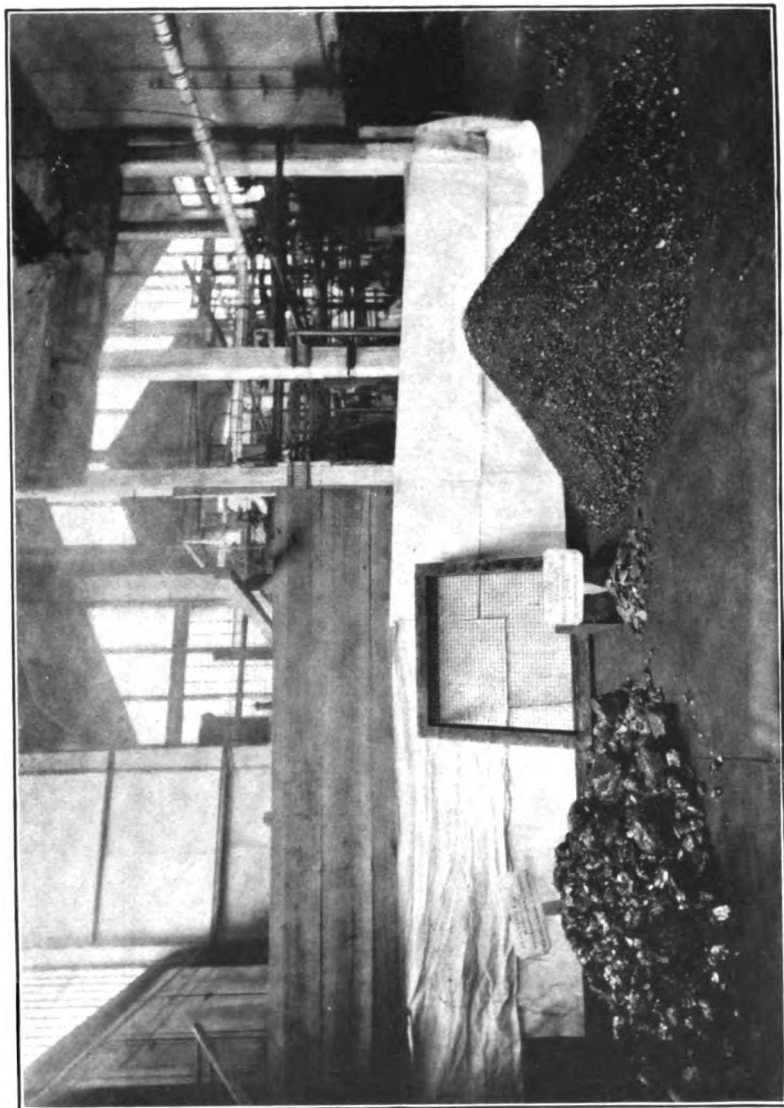
BERING RIVER COAL AS RECEIVED.

U. S. Naval Engineering Experiment Station, Annapolis, Md. Test No. 362. (Inclosure "E.")



POCAHONTAS COAL AS RECEIVED.

U. S. Naval Engineering Experiment Station, Annapolis, Md. Test No. 362. (Inclosure F.)



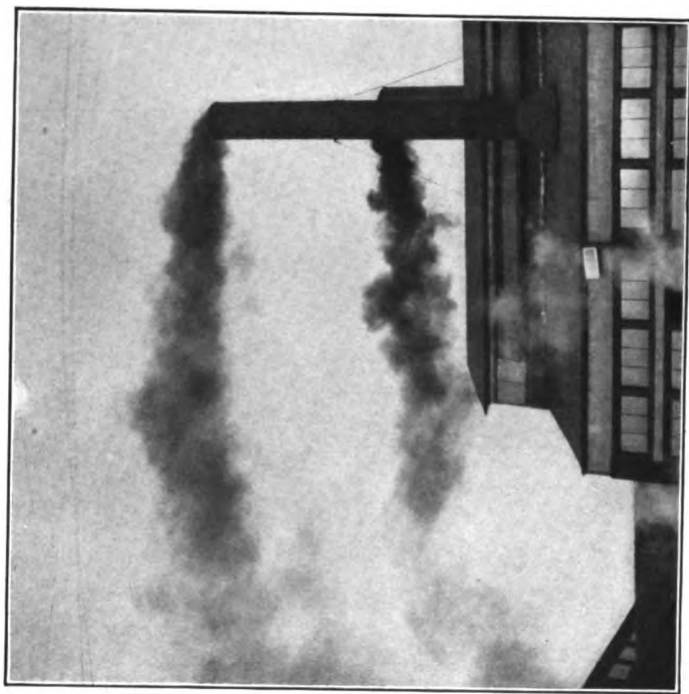
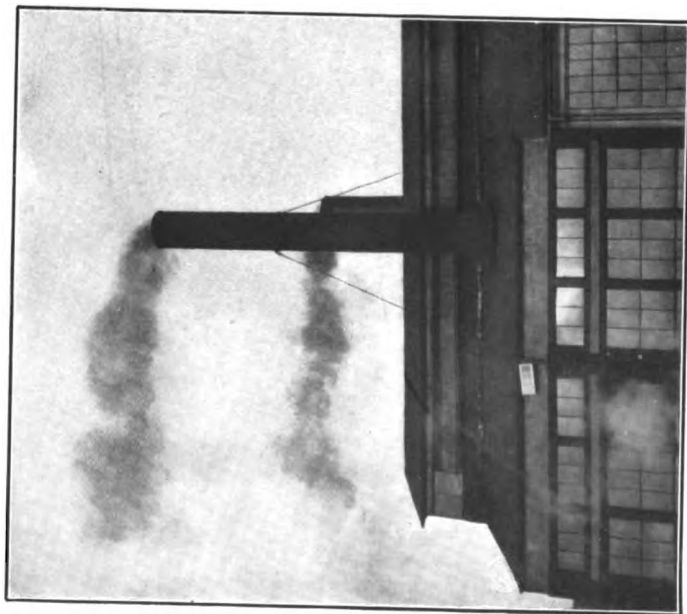
Over $\frac{1}{4}$ -inch screen, 25.4 per cent.

Slate, 0.9 per cent.

Through $\frac{1}{8}$ -inch screen, 73.7 per cent.

SCREENED BERING RIVER COAL.

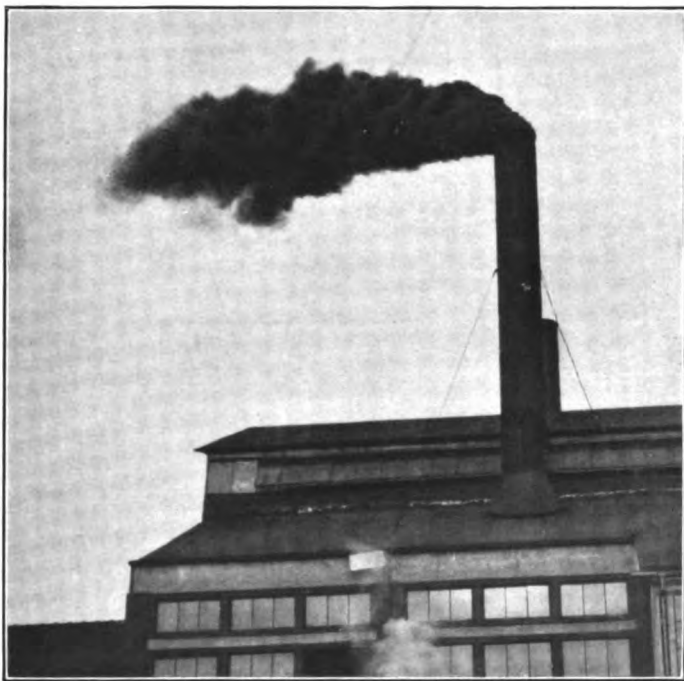
U. S. Naval Engineering Experiment Station, Annapolis, Md. Test No. 362. (Inclosure G.)



SMOKE FROM POCAHONTAS COAL.

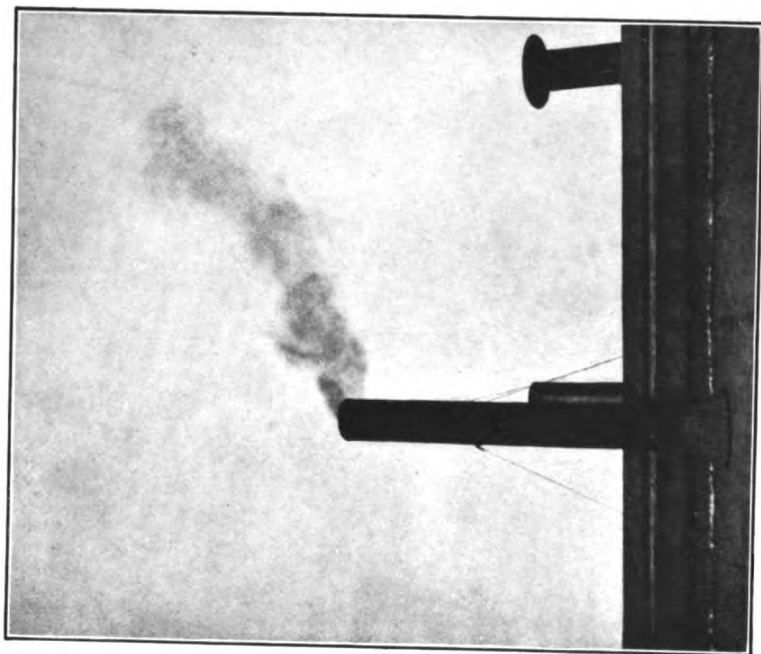
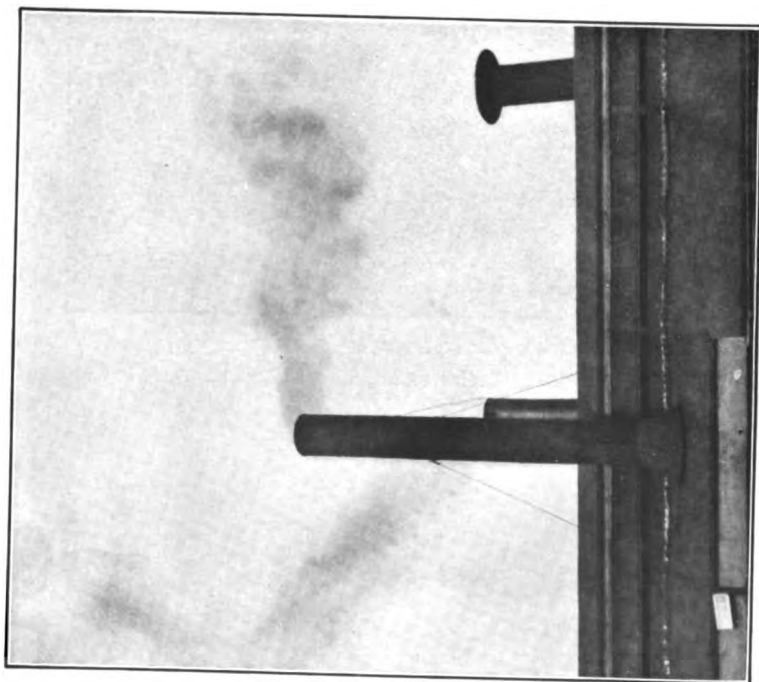
U. S. Naval Engineering Experiment Station, Annapolis, Md. Test No. 362. (Inclosure Q-1.)

H. Doc. 876, 63-2.



SMOKE FROM POCAHONTAS COAL.

U. S. Naval Engineering Experiment Station, Annapolis, Md. Test No. 362. (Inclosure Q-1.)



SMOKE FROM BERING RIVER COAL.

U. S. Naval Engineering Experiment Station, Annapolis, Md. Test No. 362. (Inclosure Q-2.)

PRESSURE GAUGE CHART.

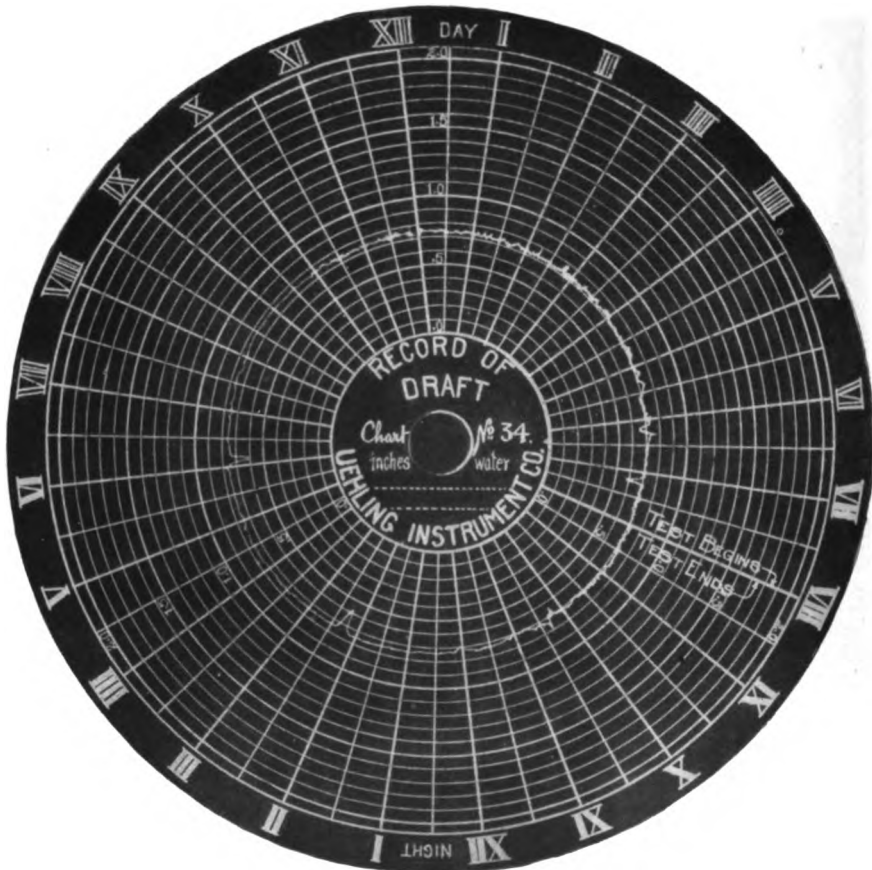
[illegible]

December 16-17, 1913.

H. Doc. 876, 63-2.

STACK DRAFT CHART.

U. S. Naval Engineering Experiment Station, Annapolis, Md. Test No. 362. (Inclosure T.)



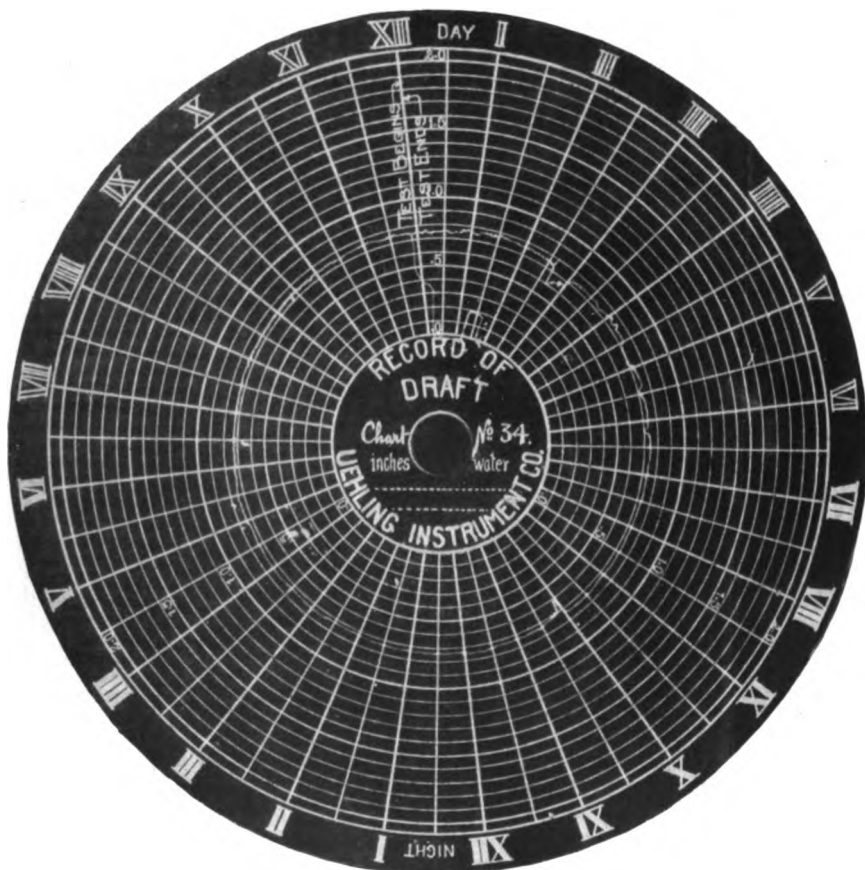
BERING RIVER COAL TEST.

December 17-18, 1913.

H Doc. 876, 63-2.

STACK DRAFT CHART.

U. S. Naval Engineering Experiment Station, Annapolis, Md. Test No. 362. (Inclosure T.)



POCAHONTAS COAL TEST.

December 16-17, 1913.

SIXTH INTERNATIONAL SANITARY CONFERENCE OF
AMERICAN STATES.

L E T T E R

FROM

THE SECRETARY OF THE TREASURY.

TRANSMITTING

COPY OF A LETTER FROM THE SECRETARY OF STATE, RELATIVE
TO AN ITEM OF APPROPRIATION IN THE AMOUNT OF \$2,000, TO
ENABLE THE UNITED STATES TO BE REPRESENTED BY THE
PUBLIC HEALTH SERVICE IN THE SIXTH INTERNATIONAL SAN-
ITARY CONFERENCE OF AMERICAN STATES TO BE HELD AT
MONTEVIDEO, URUGUAY, IN DECEMBER, 1914.

APRIL 10, 1914.—Referred to the Committee on Appropriations and ordered to be
printed.

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, April 8, 1914.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit copy of a letter from the hon-
orable, the Secretary of State, requesting that the following item
be included in the "Act making appropriations for the Diplomatic
and Consular Service for the fiscal year ending June 30, 1915":

To enable the United States to be represented by the Public Health Service in
the Sixth International Sanitary Conference of American States, to be held at the
city of Montevideo, Uruguay, in December, 1914, including the expenses of assem-
bling the necessary data and of the preparation of a report and the traveling expenses
of two officers from the United States to Montevideo and return, \$2,000, or so much
thereof as may be necessary.

The importance of having the United States represented at the
Sixth International Sanitary Conference, to be held at Montevideo,
Uruguay, December 13-21, 1914, is apparent, both from the letter
of the Secretary of State and from information in my possession. I
have therefore the honor to request that an appropriation for this
purpose be made as requested by the Secretary of State.

Respectfully,

H D—63-2—vol 158—24

W. G. McADOO, *Secretary.*

DEPARTMENT OF STATE,
Washington, March 30, 1914.

The honorable the SECRETARY OF THE TREASURY.

SIR: In a letter dated November 3, 1913, your department recommended that application be made to Congress for an appropriation of \$2,000 to enable the Government of the United States to be represented by the Public Health Service in the Sixth International Sanitary Conference, which will hold its session at Montevideo, Uruguay, from December 13 to 21, 1914.

The Department of State has now received the official call for the conference, a copy of which, together with the provisional program for the conference, is inclosed herewith.

Accordingly, I have the honor to request that you will submit to the Speaker of the House of Representatives the following item of appropriation, approved by the President:

To enable the United States to be represented by the Public Health Service in the Sixth International Sanitary Conference of American States, to be held at the city of Montevideo, Uruguay, in December, 1914, including the expenses of assembling the necessary data and of the preparation of a report and the traveling expenses of two officers from the United States to Montevideo and return, \$2,000, or so much thereof as may be necessary.

Although the information is known to your department, I think it well to state, for the information of Congress, the following facts:

Five previous International Sanitary Conferences have been held by the Republics of the Western Hemisphere, to wit, at Washington in 1902 and 1905; at Mexico City in 1907; at San Jose, Costa Rica, in 1909; at Santiago, Chile, in 1911. These conferences were held, and the one at Montevideo will be held, with a view of minimizing the restrictions on commerce, the unifying of quarantine regulations of the various countries, and the making of each of the participating Republics familiar with the progress in hygiene accomplished in the other Republics, and promoting in general better relations among American Governments.

These conferences were inaugurated in accordance with the fifth resolution concerning international sanitary policy, adopted by the Second International Conference of American States, held in the city of Mexico October 22, 1901, to January 22, 1902, which reads as follows:

5. The second international conference of the American States further recommends, in the interest of the mutual benefit that would be derived therefrom by each of the American Republics, and that they may more readily and effectively cooperate one with the other in all matters appertaining to the subjects mentioned in the above resolutions, that a general convention of representatives of the health organizations of the different American Republics shall be called by the governing board of the International Union of American Republics to meet at Washington, D. C., within one year from the date of the adoption of these resolutions by this conference; that each Government represented in this conference shall designate one or more delegates to attend such convention; that authority shall be conferred by each Government upon its delegates to enable them to join delegates from the other Republics in the conclusion of such sanitary agreements and regulations as in the judgment of said convention may be in the best interests of all the Republics represented therein; that voting in said convention shall be by Republics, each Republic represented therein to have 1 vote; that said convention shall provide for the holding of subsequent sanitary conventions at such regular times and at such places as may be deemed best by the convention; and that it shall designate a permanent executive board of not less than five members, who shall hold office until the next subsequent convention, at which time the board shall

be appointed, with a chairman to be elected by ballot by the convention; the said executive board to be known as the "International Sanitary Bureau," with permanent headquarters at Washington, D. C.

Since the inauguration of the "International Sanitary Bureau," authorized by the above resolution, the Surgeon General of the United States Public Health Service has acted as its chairman and taken the necessary steps to issue the calls for the several conferences. The last International Sanitary Conference was held in Santiago, Chile, in November, 1911, when it was decided to hold the sixth conference in Montevideo.

After an exchange of views with the provisional president of the conference designated by the Uruguayan Government, it has been agreed between him and the Surgeon General of the United States Public Health Service, the latter in his capacity as chairman of the International Sanitary Bureau, that the sixth conference should be held at Montevideo in December, 1914, and a decree has been issued by the President of Uruguay fixing December 13 to 21 for the sessions of the conference. It is in accordance with this agreement that the call for the Montevideo conference has been issued.

The holding of biennial sanitary conferences affords opportunity for the exchange of views in respect to the control of quarantinable diseases, particularly yellow fever, and the improvement of sanitation. With the opening of the Panama Canal it is of even greater importance that the sanitary authorities of the several Republics should be able to meet and work together for greater uniformity in quarantine practice and such reasonable reductions of quarantine restrictions as will facilitate commerce and afford protection against disease.

At this time it is particularly important that the United States should participate in the forthcoming conference. The amount necessary to provide for such participation is small, and out of all proportion to the benefits to be derived. Following the adoption of the international sanitary agreement of December 14, 1905, which represented the work of one of these conferences, and the greater public health activity which followed its enforcement, yellow fever has been practically eliminated from the Western Hemisphere. It is believed that the holding of these conferences can be made to contribute and to become largely instrumental in the improvement of international sanitation. Funds should accordingly be provided for representation by the Government at the conference in Montevideo.

I am, sir, your obedient servant,

W. J. BRYAN.

CALL FOR THE SIXTH INTERNATIONAL SANITARY CONFERENCE.

In accordance with the resolution adopted at the Fifth International Sanitary Conference, held in the city of Santiago, Chile, from November 5 to 11, 1911, the date, December 13-21, 1914, has been fixed for the assembling of the Sixth International Sanitary Conference in the city of Montevideo, Uruguay.

The following official correspondence in regard to the call and the provisional program of the conference is printed in the interest of the conference:

INTERNATIONAL SANITARY BUREAU,
Washington, D. C., March 7, 1914.

HON. JOHN BARRETT,
Director General Pan American Union,
Washington, D. C.

SIR: In accordance with a resolution adopted at the Fifth International Sanitary Conference, held at Santiago, Chile, and with the approval of the International Sanitary Bureau, I am inclosing the call for the meeting of the Sixth International Sanitary Conference. A copy of the provisional program for this conference is also forwarded.

I request that, in conformity with the provisions of paragraph 7 of the resolutions relating to sanitary police, adopted at the Second International Conference of American States, you take the necessary steps to bring this call and the provisional program to the attention of the Governments concerned.

Respectfully,

RUPERT BLUE,
Provisional Chairman International Sanitary Bureau.

SIXTH INTERNATIONAL SANITARY CONFERENCE OF THE AMERICAN REPUBLICS, TO BE
HELD IN MONTEVIDEO, URUGUAY, DECEMBER 13-21, 1914.

INTERNATIONAL SANITARY BUREAU
OF THE AMERICAN REPUBLICS,
Washington, D. C., March 7, 1914.

In compliance with the resolution adopted at the Fifth International Sanitary Conference, the Sixth International Sanitary Conference of the American Republics will be held in Montevideo, Uruguay, December 13-21, 1914, under the presidency of Dr. E. Fernández Espiro and the auspices of the Government of Uruguay.

A number of important sanitary subjects will be discussed at this conference, and it is expected that all the nations interested will be duly represented.

PROVISIONAL PROGRAM FOR THE SIXTH INTERNATIONAL SANITARY CONFERENCE OF
THE AMERICAN REPUBLICS, TO BE HELD AT MONTEVIDEO, URUGUAY, DECEMBER
13-21, 1914.

1. Review of sanitary legislation enacted in the different countries since the fifth conference.
2. Report of progress made in adopting the resolutions agreed to in preceding conferences.
3. Reports on morbidity and mortality statistics subsequent to the last conference.
4. Recent developments in the campaign against plague, yellow fever, leprosy, trachoma, malaria, hookworm disease, tuberculosis, and venereal diseases.
5. Measures adopted to combat the prevalence of cerebrospinal meningitis, and acute anterior poliomyelitis.
6. Progress made in maritime sanitation since the last conference, especially with reference to the opening of the Panama Canal.
7. Data relating to the work of the sanitary information bureau of Montevideo. (This subject will be treated by the delegation of Uruguay.)

NOTE.—With the approval of the program committee additional papers may be presented by any delegation on sanitary or scientific subjects of general interest.

The reports by the various delegations shall be submitted in printed form to the secretary of the conference before the beginning of the sessions and will be accompanied by a short résumé.

INTERNATIONAL EXPOSITION OF SEA FISHERY INDUSTRIES, BOULOGNE-SUR-MER, FRANCE.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

A COMMUNICATION FROM THE SECRETARY OF STATE IN REGARD TO AN INVITATION FROM THE FRENCH REPUBLIC TO THIS GOVERNMENT TO PARTICIPATE IN AN INTERNATIONAL EXPOSITION OF SEA FISHERY INDUSTRIES, TO BE HELD AT BOULOGNE-SUR-MER, FRANCE, JUNE 15 TO OCTOBER 1, 1914.

APRIL 10, 1914.—Referred to the Committee on Foreign Affairs and ordered to be printed.

To the Senate and House of Representatives:

In view of a provision of law contained in the deficiency act, approved March 4, 1913, that "hereafter the Executive shall not extend or accept any invitation to participate in any international congress, conference, or like event without first having specific authority of law to do so," I transmit herewith, for the consideration of Congress and for its determination whether it will authorize the acceptance of the invitation, a communication from the Secretary of State, with regard to the invitation from the Government of the French Republic to that of the United States to be represented by a delegate at an international exposition of sea fishery industries, to be held at Boulogne-sur-Mer, from June 15 to October 1, 1914. It will be observed that the acceptance of this invitation will involve no special appropriation of money by the Government.

WOODROW WILSON.

THE WHITE HOUSE,
Washington, April 9, 1914.

The PRESIDENT:

On February 25, 1914, the ambassador of the French Republic at this Capital, by order of his Government, extended to the Government of the United States an invitation to participate in an international exposition of sea-fishery industries to be held at Boulogne-sur-Mer from the 15th of June to the 1st of October of the present year, and to be officially represented therein by a delegate.

The Department of Commerce, to which this invitation was referred, has advised me that the exposition will doubtless contain features of great practical value to the United States, and that there should be a critical examination of the exhibits from the viewpoint of the American fishery interests, and has recommended that this Government take advantage of the presence of an official representative of this Government at the annual conference of the International Council for the Study of the Sea, to be held in Copenhagen, Denmark, in September next, for which provision has been made by Congress, and that this representative be made a delegate to the International Exposition of Sea Fishery Industries, with authority to devote a limited amount of time thereto. The Department of Commerce states that no special appropriation will be required for this purpose.

The Executive being precluded by a provision of the deficiency act approved March 4, 1913, from accepting an invitation of this nature without specific authority of law, I have the honor to submit the matter herewith, to the end that should you approve thereof it may be transmitted to Congress for that body to determine whether it will authorize the acceptance of the invitation.

Respectfully submitted.

W. J. BRYAN.

DEPARTMENT OF STATE,
Washington, April 4, 1914.

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THE SITUATION IN OUR DEALINGS WITH
GENERAL VICTORIANO HUERTA, AT MEXICO CITY

ADDRESS
OF THE
PRESIDENT OF THE
UNITED STATES

DELIVERED AT A JOINT SESSION OF THE
TWO HOUSES OF CONGRESS

APRIL 20, 1914



APRIL 20, 1914.—Referred to the Committee on Foreign Affairs
and ordered to be printed

WASHINGTON
1914



ADDRESS.

GENTLEMEN OF THE CONGRESS:

It is my duty to call your attention to a situation which has arisen in our dealings with General Victoriano Huerta at Mexico City which calls for action, and to ask your advice and cooperation in acting upon it. On the 9th of April a paymaster of the U. S. S. *Dolphin* landed at the Iturbide Bridge landing at Tampico with a whaleboat and boat's crew to take off certain supplies needed by his ship, and while engaged in loading the boat was arrested by an officer and squad of men of the army of General Huerta. Neither the paymaster nor anyone of the boat's crew was armed. Two of the men were in the boat when the arrest took place and were obliged to leave it and submit to be taken into custody, notwithstanding the fact that the boat carried, both at her bow and at her stern, the flag of the United States. The officer who made the arrest was proceeding up one of the streets of the town with his prisoners when met by an officer of higher authority, who ordered him to return to the landing and await orders; and within an hour and a half from the time of the arrest orders were received from the commander of the Huertista forces at Tampico for the release of the paymaster and his men. The release was followed by apologies from the commander and later by an expression of regret by General Huerta himself. General Huerta urged that martial law obtained at the time at Tampico; that orders had been issued that no one should be allowed to land at the Iturbide Bridge; and that our sailors had no right to land there. Our naval commanders at the port had not been notified of any such prohibition; and, even if they had been, the only justifiable course open to the local authorities would have been to request the paymaster and his crew to withdraw and to lodge a protest with the commanding officer of the fleet. Admiral Mayo regarded the arrest as so serious an affront that he was not satisfied with the apologies offered, but demanded that the flag of the United States be saluted with special ceremony by the military commander of the port.

The incident can not be regarded as a trivial one, especially as two of the men arrested were taken from the boat itself—that is to say, from the territory of the United States—but had it stood by itself it might have been attributed to the ignorance or arrogance of a single officer. Unfortunately, it was not an isolated case. A series

of incidents have recently occurred which can not but create the impression that the representatives of General Huerta were willing to go out of their way to show disregard for the dignity and rights of this Government and felt perfectly safe in doing what they pleased, making free to show in many ways their irritation and contempt. A few days after the incident at Tampico an orderly from the U. S. S. *Minnesota* was arrested at Vera Cruz while ashore in uniform to obtain the ship's mail, and was for a time thrown into jail. An official dispatch from this Government to its embassy at Mexico City was withheld by the authorities of the telegraphic service until peremptorily demanded by our chargé d'affaires in person. So far as I can learn, such wrongs and annoyances have been suffered to occur only against representatives of the United States. I have heard of no complaints from other Governments of similar treatment. Subsequent explanations and formal apologies did not and could not alter the popular impression, which it is possible it had been the object of the Huertista authorities to create, that the Government of the United States was being singled out, and might be singled out with impunity, for slights and affronts in retaliation for its refusal to recognize the pretensions of General Huerta to be regarded as the constitutional provisional President of the Republic of Mexico.

The manifest danger of such a situation was that such offenses might grow from bad to worse until something happened of so gross and intolerable a sort as to lead directly and inevitably to armed conflict. It was necessary that the apologies of General Huerta and his representatives should go much further, that they should be such as to attract the attention of the whole population to their significance, and such as to impress upon General Huerta himself the necessity of seeing to it that no further occasion for explanations and professed regrets should arise. I, therefore, felt it my duty to sustain Admiral Mayo in the whole of his demand and to insist that the flag of the United States should be saluted in such a way as to indicate a new spirit and attitude on the part of the Huertistas.

Such a salute General Huerta has refused, and I have come to ask your approval and support in the course I now purpose to pursue.

This Government can, I earnestly hope, in no circumstances be forced into war with the people of Mexico. Mexico is torn by civil strife. If we are to accept the tests of its own constitution, it has no government. General Huerta has set his power up in the City of Mexico, such as it is, without right and by methods for which there can be no justification. Only part of the country is under his control. If armed conflict should unhappily come as a result of his attitude of personal resentment toward this Government, we should be fighting only General Huerta and those who adhere to him and give him their support, and our object would be only to restore to the

people of the distracted Republic the opportunity to set up again their own laws and their own government.

But I earnestly hope that war is not now in question. I believe that I speak for the American people when I say that we do not desire to control in any degree the affairs of our sister Republic. Our feeling for the people of Mexico is one of deep and genuine friendship, and everything that we have so far done or refrained from doing has proceeded from our desire to help them, not to hinder or embarrass them. We would not wish even to exercise the good offices of friendship without their welcome and consent. The people of Mexico are entitled to settle their own domestic affairs in their own way, and we sincerely desire to respect their right. The present situation need have none of the grave implications of interference if we deal with it promptly, firmly, and wisely.

No doubt I could do what is necessary in the circumstances to enforce respect for our Government without recourse to the Congress, and yet not exceed my constitutional powers as President; but I do not wish to act in a matter possibly of so grave consequence except in close conference and cooperation with both the Senate and House. I, therefore, come to ask your approval that I should use the armed forces of the United States in such ways and to such an extent as may be necessary to obtain from General Huerta and his adherents the fullest recognition of the rights and dignity of the United States, even amidst the distressing conditions now unhappily obtaining in Mexico.

There can in what we do be no thought of aggression or of selfish aggrandizement. We seek to maintain the dignity and authority of the United States only because we wish always to keep our great influence unimpaired for the uses of liberty, both in the United States and wherever else it may be employed for the benefit of mankind.



PREVENTION OF DAMAGE BY FLOODS.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING

REPORT OF THE BOARD OF OFFICERS OF THE CORPS OF ENGINEERS OF THE UNITED STATES ARMY APPOINTED APRIL 12, 1913, UPON THE MOST PRACTICABLE AND EFFECTIVE MEASURES FOR PREVENTION OF DAMAGE BY FLOOD TO WORKS CONSTRUCTED FOR THE IMPROVEMENT OF NAVIGATION, OF INTERFERENCE WITH INTERSTATE COMMERCE, AND OTHER DISASTROUS RESULTS THEREOF.

APRIL 21, 1914.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, April 15, 1914.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a report of a board of officers of the Corps of Engineers of the United States Army, appointed on April 12, 1913, following the disastrous floods in the valley of the Ohio River, and the drainage area of Lake Erie in the spring of 1913, to make a thorough inquiry and examination into existing conditions, and to report upon the most practicable and effective measures for prevention of damage by floods to works constructed for the improvement of navigation, of interference with interstate commerce, and of other disastrous results thereof.

On May 26, 1913, this board submitted a preliminary report which was published in House Document No. 246, Sixty-third Congress, first session. As contemplated in that report the board has continued its investigation, and the report herewith is the result. This report shows at length that one of the chief causes of flood damage is the obstructions placed in the flood beds of the streams.

The Federal Government through the War Department at present exercises control over obstructions in waterways under the provisions

of sections 9, 10, and 13 of act of Congress approved March 3, 1899. Sections 9 and 10, which cover obstructions built across or in waterways, apply only to navigable waterways, while section 13, covering deposits of material in streams, applies to the tributaries of navigable waterways as well as to navigable waterways themselves. In a few cases concerning dams section 9 has been construed to extend to non-navigable tributaries or nonnavigable portions of the main streams on account of the effect of dams upon the navigable capacity of the main stream, but as a rule there has not been and can not well be comprehensive supervision, under existing law, over obstructions across or in the nonnavigable tributaries. Had sections 9 and 10 been as general in their application as section 13, much of the flood damage might have been avoided. In order to prevent still greater damage from this cause in the future the jurisdiction of the War Department over obstructions in streams should be extended to the feeders and tributaries of navigable waterways. Legislation to accomplish this is suggested in detail later in this report. The expense involved in enforcing existing legislation with respect to all navigable waters of the United States is small, and the expense due to the proposed legislation would not increase it greatly.

The board has considered many methods of flood protection and prevention, and concludes that—

1. Forestation and special methods of plowing are not usually productive of practical results to an extent that would make it profitable to consider their employment.

2. Reservoirs, both storage and impeding, may be used to advantage in certain localities, especially on the smaller streams and where good reservoir sites are obtainable at reasonable cost.

3. The method of moving structures and bulky material out of the flood area will afford prompt and certain relief both by saving the property moved and by reducing flood heights and velocities by removing the obstructions. This method should be adopted so far as practicable, and new obstructions should be prevented.

4. Auxiliary channels, both parallel channels and cut-offs, may be used to advantage in certain cases.

5. Levees when properly built in accordance with correct designs have been almost uniformly successful; they give quick relief and are equally suitable for local and extended uses.

6. No one method of flood control can be recommended to the exclusion of others. Local conditions vary so greatly between several basins that what is suitable to one stream is likely to be unsuitable for another.

The board's final conclusion is thoroughly borne out by a brief consideration of the solutions adopted or recommended in some of the localities that have already been studied.

In the opinion of the Mississippi River Commission and of the Chief of Engineers United States Army, the only practicable method of flood protection in the lower Mississippi Valley is that by construction of an adequate system of well-designed levees supplemented by bank protection. The project for flood protection in the Sacramento Valley, Cal., contemplates an extensive use of auxiliary channels. The city of Galveston, Tex., secured flood protection by raising the grade of the city. For the Miami River, Ohio, it is understood that the engineers employed by the city of Dayton, Ohio, have recommended a system of reservoirs.

The board has collected a large amount of data, some of which was already available in the various district offices of the Engineer Department, but finds that additional data in the way of rainfall statistics, gauging of streams, and special maps of drainage areas must be obtained before specific plans can be prepared. The board finds that some of these data can be obtained through the regular operations of the United States Weather Bureau, the United States Geological Survey, and of the States, counties, cities, etc., in the areas involved, under the system which has existed in the past, but that a large part of it can best be obtained by field parties organized in each of the engineer districts of the area under consideration (Pittsburgh, Wheeling, Cleveland, first Cincinnati, second Cincinnati, and Louisville). The cost involved in collecting these data and preparing plans will be relatively small in comparison with the benefit to be derived, and this same method can readily be extended as necessary to the drainage areas of all rivers throughout the country which are subject to disastrous floods.

The subject of flood protection and flood prevention is one of great national import, and it is imperative that steps be taken to ameliorate conditions in the most afflicted districts in the various parts of the United States without unnecessary delay.

The interests of navigation and of interstate commerce demand that the Federal Government seek a remedy and join with the local interests in applying it. Economical and efficient cooperation on the part of local interests is extremely difficult to attain unless the Federal Government lends its unifying and guiding power. By extension of the authority conveyed by sections 9 and 10, act of 1899, recommended above, the War Department would be empowered to pass upon plans evolved by various of the communities, with a view to insuring that they do not conflict with a general plan of flood protection for the entire district to the detriment of navigation and other interests; but it is my belief that the Federal Government should go further, and that to accomplish the best results it should undertake to prepare general plans of flood prevention and protection, to pass upon and coordinate plans prepared by the various communities, to arrange for a fair and proper distribution of the cost of execution of such plans, and the portion of the work to be accomplished by each of the interested parties. The portion of the expense of the undertaking which should be borne by the Federal Government should be the value of the protection rendered to navigation, to interstate commerce, and other Federal interests.

If this work be placed under the War Department on the same basis as the river and harbor work, with which it is intimately connected, it can be accomplished with no large initial expense. No new and expensive organization need be created. Each case requiring appropriation will be presented in an intelligent, concise, and concrete manner for consideration by Congress, and with Congress will rest the decision as to which rivers shall be considered, and the rate at which they shall be appropriated for.

No new idea is involved in this arrangement; it is simply an extension of a plan that has operated successfully in several cases heretofore, notably in the California Débris Commission's project for the Sacramento and San Joaquin Valleys in California (H. Doc. No. 81, 62d Cong., 1st sess.). That project involves improvement of naviga-

tion, flood control, and the regulation of mining detritus, with irrigation and drainage problems also involved, at a cost originally estimated as \$33,000,000, of which the United States was to contribute \$11,000,000, as being the estimated value of the improvement to navigation.

Hardly was this plan formulated when the local interests set to work on an enormous scale without awaiting appropriations from the United States or the State, so that in February, 1913, the estimate of the cost of the work remaining to be done to complete the original plan was \$11,717,000, of which the United States was to contribute one-half.

The same plan has been partially adopted in connection with the Mississippi River and can be readily extended with the help of the Mississippi River Commission to a complete solution of this great problem whenever Congress shall so decree.

I therefore wish to urge upon Congress the desirability of enacting the following legislation:

First. To extend the jurisdiction of the War Department to all feeders or tributaries of navigable waterways by the insertion of the following item in the pending river and harbor bill, or by a separate bill:

Sec. —. That section ten of the river and harbor act approved March third, eighteen hundred and ninety-nine, be amended by adding at the end thereof the following:

"And it shall not be lawful to place any obstruction in, along, or across any feeder or tributary of any navigable waterway of the United States which in the judgment of the Chief of Engineers and the Secretary of War will, in connection with floods or otherwise, injuriously affect the navigable capacity of said waterway or any structure built in aid of navigation, except as recommended by the Chief of Engineers and authorized by the Secretary of War."

Second. To authorize preliminary examination and survey in the pending river and harbor bill of the following streams with a view to devising plans for flood protection and determining the extent to which the United States should cooperate with the States and other interests in carrying out such plans, its share being based upon the value of the protection to navigation and interstate commerce: Cheat River, Pa. and W. Va.; Tygarts River, W. Va.; West Fork River, W. Va.; Kanawha River and its tributaries, W. Va.; Muskingum River and its tributaries, Ohio; Scioto River and its tributaries, Ohio; Maumee River and its tributaries, Ohio and Ind.; and the Wabash River and its tributaries, Ill. and Ind.

The estimated cost of the survey of all the streams above mentioned is \$80,000.

It is believed that the \$250,000 carried by the pending river and harbor bill for examinations and surveys will be sufficient, with the balance remaining from previous appropriations, to provide for these surveys should they be authorized.

Third. To authorize preliminary examination and survey of such other streams from time to time as may warrant investigation with a view to protection from flood damage. Some of those meriting early consideration are the Mohawk, the upper Hudson, the Delaware, the Susquehanna, and the Brazos, with their tributaries.

The above expresses the views of the Chief of Engineers, United States Army, as well as my own.

Very respectfully,

LINDLEY M. GARRISON,
Secretary of War.

**CORPS OF ENGINEERS, UNITED STATES ARMY,
BOARD OF OFFICERS ON RIVER FLOODS,
Pittsburgh, Pa., February 16, 1914.**

From: The Senior Member, Board of Officers on River Floods.
To: The Chief of Engineers, United States Army.
Subject: Report on flood conditions.

1. The board of officers on river floods submits report in compliance with the following orders:

Special Orders, }
No. 3.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, April 12, 1913.

By direction of the Secretary of War, a board of officers of the Corps of Engineers, to consist of Lieut. Col. Francis R. Shunk, Lieut. Col. Henry Jervey, Maj. Charles S. Bromwell, Maj. John C. Oakes, Maj. Frederick W. Altstaetter, Maj. Lewis H. Rand, will assemble at Cincinnati, Ohio, upon the call of the senior member, to investigate and report upon flood conditions in the valley of the Ohio River and in the drainage area of Lake Erie.

The board will make a thorough inquiry and examination into existing conditions, conferring freely with authorities locally interested, and will report upon the most practicable and effective measures for prevention of damage by floods to works constructed for the improvement of navigation, of interference with interstate commerce, and of other disastrous results thereof.

The board is authorized, as a whole or by committees, to visit such points as it deems advisable within the area covered by its investigations and as may be necessary to conferences with authorities locally interested in the subject of its investigations.

The travel directed is necessary in the military service.

By command of the Chief of Engineers:

EDW. BURR,
Colonel, Corps of Engineers.

Special Orders, }
No. 21.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, October 29, 1913.

* * * * *

4. By authority of the Secretary of War, Maj. James P. Jervey, Corps of Engineers, is hereby detailed as a member of the board of officers of the Corps of Engineers, appointed by Special Orders, No. 3, Office of the Chief of Engineers, April 12, 1913, to investigate and report upon flood conditions in the valley of the Ohio River and in the drainage area of Lake Erie, vice Maj. Frederick W. Altstaetter, Corps of Engineers.

* * * * *

By command of the Chief of Engineers:

EDW. BURR,
Colonel, Corps of Engineers.

Special Orders, }
No. 22.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 18, 1913.

By authority of the Secretary of War, Maj. Frederick W. Altstaetter, Corps of Engineers, is hereby detailed as an additional member of the board of officers of the Corps of Engineers, appointed by Special Orders, No. 3, Office of the Chief of Engineers, April 12, 1913, to investigate and report upon flood conditions in the valley of the Ohio River and in the drainage area of Lake Erie.

By command of the Chief of Engineers:

EDW. BURR,
Colonel, Corps of Engineers.

2. Since its organization the board or its committees have visited 66 places, have passed upon plans submitted by municipal authorities for Columbus, Lima, and Toledo, and has now under consideration plans for Fort Wayne, Ind.

3. Conditions in the Ohio and Lake Erie basins were described in the preliminary report of the board submitted May 26, 1913. More detailed descriptions may be found in Appendixes E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, AA, BB, CC, DD, EE, FF, GG, HH, II, JJ, KK, LL, MM, NN, OO, PP, QQ, RR, SS, TT, and UU.¹

4.² The funds at the disposal of the board have only been sufficient for the necessary traveling and for collection of existing information. After study of the data so obtained, the board is able to report that certain proposed methods of flood relief may be eliminated, and that the problem is to be solved by the application of certain other methods. But no specific application of the proposed methods to particular streams can yet be made.

5. *Causes and methods of prevention.*—The causes of floods in general are excessive precipitation, quick run-off, and inadequate carrying capacity of waterways. Methods of prevention of floods must, therefore, contemplate control of precipitation, control of run-off, or provision of adequate channels of escape. Damage by floods might also be largely prevented by another method not involving control of the flood itself, namely, by moving valuable property beyond the flood limits. For convenience, the last-named method will be treated first.

6. *Vacating flood plain.*—The method of moving property out of the way is that which will afford the most prompt and certain relief, and its adoption should be urged in all cases where at all practicable. The investigations of the board during the months of April and May, 1913, which consisted in personal inspections of 66 localities, showed that in every case a large percentage of the damage suffered was due to the fact that people had knowingly erected buildings and lived in territory which has always been subject to inundation by high water. It was evident that present conditions would have been far better if, in the past, when towns, roads and railroads, etc., were being located, some effective authority had been exercised to regulate the placing of permanent structures on the lowlands of the rivers in the Ohio and Lake Erie basins. However, millions of dollars have been spent in improving lowlands which are subject to floods and in making encroachments which have so diminished the flood carrying capacity of streams as to increase the height of floods and the velocity of flood currents. Some of this work can be undone, and in every case, where possible, it should be undone. On the other hand, the cost of completely remedying these mistakes—in some cases involving the moving of large portions of cities of 10,000 or more inhabitants, such as Cairo (14,548), Portsmouth (23,481), Marietta (12,923), Zanesville (28,026), etc.—would be so enormous that it is evident that some form of flood control or flood protection will be much less expensive. To find this is the chief duty of this board.

7. *Forestation as means of controlling precipitation.*—The only method of controlling precipitation which has been seriously proposed is that of forestation. The question has been debated at length in recent years and was considered by the National Waterways Com-

¹ Not printed.

² The present report of the board is not final. The board hopes at some future day to submit a definite project accompanied by estimates of cost, but before this is possible a great deal of field work must be done in the way of examination, survey, and gauging.

mission in its recent investigations. The conclusions of the commission on this subject are given on page 32 of the final report (S. Doc. No. 469, 62d Cong., 2d sess.) as follows:

An impartial consideration of the results of investigations relating to the influence of forests upon precipitation does not warrant the assertion that such influence is marked, nor can it be said that forests exercise no influence whatever. The present status of this question was very fairly stated in 1902 by Prof. B. E. Fernow in Bulletin 7 of Forest Service, page 125:

Altogether, the question of appreciable forest influence upon precipitation must be considered as still unsolved, with some indication, however, of its existence under certain climatic and topographical conditions in the Temperate Zone, especially toward the end of winter and the beginning of spring.

Whatever influence forests may have upon precipitation, it certainly is not sufficient to appreciably affect stream flow and the navigability of streams, and thus is not essential to this discussion.

8. Most authorities take the view that forests have less effect on rainfall than that quoted above; but, even taking the favorable view quoted, the board would seem to be warranted in assuming that for all practical purposes the control of precipitation by means of forests is impossible and that the meteorological causes of floods are beyond human control.

9. *Methods of controlling run-off.*—The methods proposed for controlling run-off are forestation, special methods of plowing, and reservoirs.

10. *Forestation as a means of controlling run-off.*—This subject is discussed in the report of the National Waterways Commission (S. Doc. 469, 62d Cong., 2d sess., pp. 33 and 34) on the effect of forests upon run-off and upon floods. This is quoted in full as follows (*italics have been inserted by the board*):

Effect of forests upon run-off.—The influence of forests upon the run-off of rainfall, because of its equalizing effect upon stream flow, is considered much more important for navigation than the influence upon precipitation. The rainfall over a forest, as Mr. Zon explains, is carried off in five different ways: (1) Part of it is intercepted by the leaves and branches of the trees and evaporated into the air; (2) another part is evaporated from the soil within the forest; (3) a third part is absorbed and used by plants and trees for transpiration and tissue building; (4) a fourth part runs off from the surface of the slope; (5) the surplus or that which remains after these other purposes have been served filters through the ground and feeds springs and streams. The amount of water evaporated from tree tops and absorbed by forests in transpiration are losses directly due to forests and vary greatly under different conditions. The amount of rain evaporated from the tree tops depends, among other things, upon the character of the trees, their age and density, the amount of precipitation, velocity of wind, and temperature, and sometimes, as already indicated, assumes large proportions. Likewise the amount of water absorbed by forests for their own use depends upon the character of trees, temperature, and numerous other factors. Forests conserve water to the extent that the lower temperature and more humid air within retards evaporation from the surface, and the forest humus absorbs the water which would otherwise run off on the surface. The water thus retained goes to reinforce the supply of ground water and eventually benefits the flow of springs and streams. On level ground, of course, there is practically no run-off and the forests have comparatively little effect. In such cases, especially in the lowlands, it is quite probable that the loss of water due to forests exceeds the amount conserved.

The manner in which forests retard the run-off on slopes is as follows: The force of the rain is broken by the tree tops so that it reaches the ground gently, and the water caught by the leaves and branches continues to drip for a considerable time after the rain has ceased. The forest litter readily absorbs the water instead of allowing it to evaporate or to run off on the surface. The water thus absorbed percolates into the substrata, following the roots of trees, and finally by seepage reaches springs and streams.

It is generally admitted that forests exercise such reservoir characteristics and under favorable conditions to a sufficient extent to improve the regularity of stream flow. There is, however, a decided limit to the quantity of water which a forest

cover can absorb. The capacity for absorption varies greatly under different conditions, depending upon the depth and character of the forest litter as well as of the soil underneath, whether pervious or impervious, also upon the condition of the ground, whether frozen or not, upon the steepness of the slope, and numerous other factors. Where the forest litter is destroyed by forest fires, or is removed to prevent them, the absorptive capacity is thereby reduced.

Various experiments have been made to ascertain the amount of water which different kinds of forest litter could absorb and hold. *The results show that in general an amount equal to a precipitation of 0.16 of an inch can ordinarily be retained, while under favorable conditions the absorption of an amount equal to 0.24 of an inch or even more is possible.* The soil beneath the humus may also be capable of some absorption. As soon as the saturation point is reached, additional rainfall must necessarily run off on the surface just as if the ground were deforested. *This explains why forests are powerless to prevent floods, although, to the extent that they do absorb the precipitation, they may mitigate them.*

Effect of forests upon floods.—Floods are caused primarily by a heavy and prolonged precipitation, amounting oftentimes to several inches within 24 hours. During the heavy rains which caused the disastrous floods in the Passaic Valley in October, 1903, 14 inches fell at Paterson, N. J., in less than 36 hours, and during the height of the storm more than an inch an hour fell, according to records taken at New York and Newark. The worst floods usually occur in the spring, when these heavy rains fall upon a considerable accumulation of snow, which melts rapidly and augments the amount of water already precipitated. At this time the ground is more apt to be frozen or saturated and its capacity for absorption to that extent impaired.

Forests retard the melting of snow in the spring and, by allowing the water from this source to be absorbed, exercise a beneficial influence upon stream flow, but should heavy spring rains fall upon the snow thus preserved and cause it to melt within a few hours the effect of the forest is in such a case to aggravate rather than ameliorate flood conditions. *It thus appears that under one set of conditions forests may exercise a beneficial influence upon stream flow and floods, while under another their influence will be harmful.*

11. The figure given in this quotation has been applied to the State of Ohio. The average rainfall in this State from March 23 to 27, inclusive, was over 6 inches. This occurred at a time when there were no leaves on the trees and followed a series of rains which had left the ground well saturated with water. These conditions can not be assumed as favorable to the further absorption of water by forests. Assuming, however, what seems impossible, that 0.16 of an inch could have been retained by forests if the State of Ohio had been covered by one unbroken forest, only 23 per cent of the rainfall would have been retained by the storage effect of this forest.

12. From the report Reservoirs at the Headwaters of the Allegheny, Monongahela, and Ohio Rivers and their Tributaries (H. Doc. 1289, 62d Cong., 3d sess., pl. No. 17) we have the present forest area of Ohio given as a little less than 9,000 square miles, or less than a quarter of the entire area of the State (40,000 square miles). If we change 10,000 square miles of the present cultivated land of this State back to forest, this additional forest under the most favorable hypothesis would retain two-thirds of 1 per cent of the rainfall of such a storm as that of March 23–27, 1913.

13. It is impossible to expect that any large amount of cultivated land can be returned to the state of forest, or even that further clearing of tracts suitable for cultivation can be prevented. The board therefore concludes that reforestation is not a practicable method of controlling floods, and reserves for its final report the question of maintaining existing forests.

14. *Special methods of plowing.*—Under this head may be classed certain variations from the usual methods of soil preparation. As presented to this board, these variations may be divided into two classes—contour plowing and deep plowing, either separately or in

conjunction. It is not known that these ideas originated with the persons who have called them to the attention of the board; apparently the fundamental principles have long been known and practiced in sundry parts of the world.

15. *Contour plowing*.—The system of contour plowing was submitted to the board by Mr. Freeman Thorp, of Hubert, Minn., in a letter quoted in Appendix A.¹ His idea is developed, primarily, to save to the soil for its own uses at point of precipitation all the water that falls thereon in portions of the country where water is ordinarily deficient; by extension of the idea of holding all the water where it falls for a longer period than is now the case, even when the soil does not need it for its own use, comes the application to flood control through protraction of the period during which the water arrives at the watercourses. The idea is so to shape the upper surface of the ground that it will be subdivided into relatively small units entirely surrounded by ridges. It does not, in theory, depend upon the texture of the soil for its water-holding power, and the shaping of the surface to the forms is accomplished in the routine preparation of the ground for crops by care in the furrow placing as to direction and distance. It is, in effect, terracing in a small scale on side-hill slopes and (on ground where the features have such shape and size as to permit) completely inclosing small tracts by artificially raised ridges. The elevations of demarcation are so gradual that they do not interfere with the ordinary crop arrangement and handling. To obviate the practical difficulty of making the terraces or banks accurately level, short return or cut-off ridges are connected from them back to the higher ground that the tendency to accumulation of water at the low point may be checked before it has gone too far. At the instance of the Chief of Engineers the practical exposition of these principles on the land of the gentleman proposing the idea, where it has been in force for 17 years, was inspected by Lieut. Col. C. L. Potter, Corps of Engineers. An abstract of the essential portions of his report thereon is attached as Appendix B.¹

16. From this it would appear that while it apparently works out well and, as expected, on the farm in question, and that this is, at least in a measure, due to favorable soil texture, where the sandy soil absorbs the moisture, on clayey soil, or where there is a much greater rainfall it might have a destructive effect on the crops for which the farmer is working.

17. *Deep plowing*.—The system designated as deep plowing was submitted to the board by Mr. J. W. Newman, of the Kentucky State Bureau of Agriculture, in letters quoted in Appendix C.¹ His idea is developed, primarily, to increase the crop yield in the humid region and, so far as it relates to the water content, to distribute to vegetable growth during the drier periods of the year the moisture stored therein at other times. This is based on the idea of effecting the water storage in the soil, particularly the upper portions, by changing its texture, and he states that the desirable results noted by him are due to the preservation of moisture in the soil by deep plowing, obviously preventing the departure of that much water into the watercourses to contribute to floods.

¹ Not printed.

18. The underlying principles of each is the retention of the greater part of the rain on or in the ground on which it falls. If this retention could be effected on every acre of a watershed it is certain that there would be no more floods in the river. It is obvious that land occupied by villages, cities, railroads, etc., can not be treated in this way. It would seem probable that many more square miles of mountainous country, stony waste land, and the like, would not be susceptible to treatment of this kind. The board is of the opinion that both the methods proposed will, to some extent, be useful in flood control, and that they will both be usually beneficial from an agricultural standpoint, and that contour plowing will tend to prevent erosion. As a means of flood control these methods can not be recommended to the Federal Government because of the impossibility of enforcing their use.

19. *Methods eliminated.*—From its investigations and the collation of existing information the board feels justified in eliminating forestation and special plowing as methods to be undertaken by the United States. There remain to be considered reservoirs, and the various ways of increasing the capacity of channels, as by levees, widening, etc. It is by one or other of these methods, or a combination of them, that the problem is to be solved if at all.

20. *Reservoirs in general.*—Reservoirs act to prevent or diminish floods by holding out of the flood discharge a large percentage of the run-off. Considered as means of flood control they may be divided into two classes—impeding reservoirs and storage reservoirs.

21. *Impeding reservoirs.*—The reservoirs called by this name are automatic, having discharge channels, always open, so proportioned that the greatest flow through them, under the greatest head possible, will not exceed the carrying capacity of the stream below. They have been used to a limited extent in Germany, and have been considered in conjunction with other methods as a means of flood control at Columbus, Ohio, where, as the board believes, the combined system would have been successful. They have the advantage that their usefulness as flood preventers can not be diminished by other more or less incompatible uses. But they have the disadvantage that they do not give full control of the discharge, especially with respect to phenomena of interference with other streams. From an economic standpoint, as compared with storage reservoirs, they allow a great deal of valuable water to run to waste.

22. *Storage reservoirs.*—Storage reservoirs, the discharge from which is more or less completely under control, may be used for purposes other than the control of floods. Many have been built in the United States, but chiefly for power purposes, and as these have not been used for flood control they furnish no conclusive evidence of effect upon floods. Reservoirs have also been used, both in Europe and the United States, as aids to navigation, and, although the use for navigation is to a large extent incompatible with the use for flood control, they have doubtless a considerable and beneficial effect upon floods. Notably the great system in northern Minnesota, with a capacity of 94,000,000,000 of cubic feet, although manipulated primarily for the improvement of navigation, may be shown to have had an important incidental influence in mitigating floods over a considerable area. The board has exam-

ined all available literature dealing with reservoirs, and is of opinion that the subject has been exhausted so far as existing information permits.

23. The addition of another chapter of useless polemics does not seem to be desirable. The board, however, is able to state as a result of its investigations that flood control by means of reservoirs can not be dismissed forthwith as impracticable. On the contrary, for particular localities, and especially for the smaller streams, reservoirs appear to promise good results. It is to be remarked that the control of a stream like the Ohio is a problem of far greater magnitude than those presented by the comparatively small streams in Europe, for instance, where reservoirs have been used with a measure of success.

24. *Auxiliary channels.*—Auxiliary channels are of two kinds, those which parallel the stream for a large part of its length, and those which cut across bends.

25. *Parallel channels.*—Parallel channels have been suggested for the Mississippi River, but not so far as known for any of the streams in the district under consideration of the board. The topography of the river valleys in the Ohio and Erie Basins does not lend itself readily to this method, but it may be found applicable in some cases.

26. *Cut-offs.*—The board's investigations indicate that cut-offs usually give only local relief. They necessarily cause steeper slopes, higher current velocities, and consequent greater erosive power; and by delivering the water more rapidly at their lower ends have a tendency to aggravate floods at such points. However, in special cases they have great value, as indicated by the studies made at Columbus, Ohio. (See report on Columbus by Alvord & Burdick, Appendix D.')

27. *Levees.*—The great advantage of levees is that they give quick relief, they are equally suitable for local and extended uses, and are the most immediately available form of protection against floods. Their advantages and disadvantages are well known and need not here be theoretically discussed, as they have had practical trial on a large scale, both in the United States and other countries. The method by levees is recommended by E. S. Bellasis in his well-known treatise on hydraulics in the following words:

In any channel having sloping sides the velocity and discharge are more increased by raising the surface level than by deepening the bed by the same amount. It follows that embanking a river is more effective than deepening it for increasing its discharging power and enabling it to carry off floods. It is in fact the most effective plan that can be devised.

28. The board finds that where levees have been properly built in accordance with correct designs they have been almost uniformly successful. Their cost can be adjusted to the resources of the locality, by consideration of the area and value of the territory to be inclosed, the width of the low land that may be abandoned to the river, and the height of embankment required to give proper economic protection. It may be stated as certain that any successful method of flood control will include the use of levees on a considerable scale.

29. *Necessity of adequate channels.*—The necessity for providing and maintaining adequate channels for the flow of water is clearly shown by the investigations of the board. At almost all the places visited the damage done was largely caused by encroachments on

the natural channels, whereby their capacity was made insufficient. This is shown by the following extracts from reports of the several committees:

AKRON, OHIO.

[Appendix S.]

* * * At Market Street and Case Avenue the water was held back until sufficient head resulted to cause a rush of water down Case Avenue, destroying and injuring all the buildings on that street between it and the river. Lower down, the valley of the Little Cuyahoga had been greatly contracted by the railroad embankment and unauthorized filling. Still lower down, the Erie Railroad embankment crosses the entire valley of the river. The openings in this embankment exist for the roadway of the Valley Railroad, and the stream itself is carried through by two comparatively small culverts. These were of insufficient size to carry the flood and the river passed over the road of the Valley Railroad, carrying away bridges in the lower part of the stream and doing great damage to the houses located near the stream. The damage in this section of the river was further increased by a break in the hydraulic race which permitted an increased amount of water to enter the lower portion of the river.

* * * * *
The situation is so complicated in this locality, due to the location of embankments and the narrow valley of the stream, that the committee is not prepared at this time to make any definite recommendation on the subject. It is possible that there may be sites for reservoirs in this locality, as the topography appears generally favorable. It would also appear that suitable openings should be made through the obstructing embankments. If the flow of the Cuyahoga could be increased by straightening its course in the lower part, such action would undoubtedly have a beneficial effect on the discharge of the Little Cuyahoga. * * *

WARREN, OHIO.

[Appendix UU.]

* * * One steel truss through highway bridge outside the city was washed off its abutments. Drift lodged against the truss forming a dam. * * *

NEWARK, OHIO.

[Appendix W.]

* * * Conditions in the streams have been much aggravated, as in all other cases, by encroachments, largely in the matter of causeway, approaches of roadways, with bridge piers, etc. In some cases, where manufacturing plants have been established, the form of bank protection has caused the reflected flow of the stream to erode the opposite bank, and introduce conditions which the local authorities hold responsible to a certain extent for their troubles. * * *

PERU, IND.

[Appendix AA.]

* * * It was quite apparent that the flood height had been considerably raised by encroachments upon the natural flood plain, particularly by the bridge and embankment of the Chesapeake & Ohio Railroad. While exact figures are not yet available, it appears that the excess height of the recent flood over previous record high water was approximately as follows: 2 miles above town, 3 feet; 1 mile above town, 3.7 feet, and at the eastern or upstream end of town, 7.8 feet.

Two railroads and one traction line cross the flood plain of the Wabash River at this city. Of these the most important to be considered in this connection is the Chesapeake & Ohio Railroad, which comes out of the hills from the southeast opposite the upper end of town on an embankment 5 to 10 feet high, and crosses the river on a deck-girder bridge so low as to be completely submerged by the recent flood. These girders having a depth of 8 or 9 feet formed quite an effective dam. Influenced by this embankment and bridge, the flood waters were forced to the north and into the eastern end of town, a thing which had never happened before, and thence flowed west and south down each cross-town street, returning to the river with considerable velocity.

When the Chesapeake & Ohio Railroad embankment broke a strong current about 12 feet deep flowed through South Peru, carrying away and destroying many frame houses. With the exception of these houses and the washing out of roads, practically all damage was due to inundation and not to strong currents.

The total damage to Peru and vicinity is estimated at \$2,000,000. County Commissioner Jacob Casper stated that \$200,000 would be required to repair the county roads and bridges.

Thirteen people were drowned, besides quite a large amount of live stock, including eight elephants, the property of the Wallace Circus.

Bridges.—The Chesapeake & Ohio Railroad Bridge, a 5-span deck girder, has a clear opening of 371 feet. High water was 1.15 feet above the top of rail. The south approach is on a solid embankment without flood openings, except one highway underpass. This embankment was overtopped and washed out for perhaps 1,200 feet. The bridge was not damaged. * * *

The Broadway Bridge, a 3-span through truss, had a clear opening of 330 feet. High water came nearly 5 feet above the bridge floor, and carried away the entire superstructure, leaving the piers unhurt.

The Indiana Union Traction Bridge, a 5-span deck girder, had a clear opening of 840 feet. High water came nearly 5 feet above top of rail, and carried away the entire superstructure and the second pier from the south end. * * *

COLUMBUS, IND.

[Appendix BB.]

* * * The principal damage was due to the enormous destruction of railroad and highway embankments throughout an extended area and the consequent injury to adjacent farm lands. There seems to have been a mistaken idea in this section that these embankments would protect the farm lands from flood damage. That they served to increase the damage was most apparent. * * *

VARIOUS INDIANA TOWNS.

[Appendix FF.]

* * * At Indianapolis we found considerable damage, caused mainly by the contraction of the streams. The White River is joined at this point by Fall Creek. Over this creek were several bridges, which are destroyed. The most notable example of this was a Melan arch structure of three spans. The river had been narrowed above and below almost the full width of one span. The piers of the bridge had been built on sand and gravel without piles, and these piers had been undermined, dropping about half of the bridge into the river. On the White River, which is the largest stream, the bridges were both too low and too short. In numerous places the bank had been built out into the river by dumping. Van Camp's Packing Co. had filled out more than 100 feet, and just below, another firm, Kingan & Co., had built out until half of the spans of the old Big Four Railroad bridge is covered by the company's plant, the abutment being now in the engine room of this plant.

In my opinion the whole damage was caused by the embankments leading to the various bridges and the lack of sufficient waterway between the embankments and under the bridges. A portion of this town undoubtedly would have been flooded, resulting in damage to furniture, etc., due to wetting, but no destruction, such as carrying away houses, bridges, etc., would have occurred had proper waterway been provided. * * *

At Muncie there are 14 bridges over the White River, but only 3 within the city limits. Only one of these appeared to have anywhere near a sufficient waterway. The Lake Erie & Western bridge near the lower part of the town is very short, very low, and built of plate girders, the top of the girders forming a deck bridge. There is testimony that this bridge raised the water above to over 4 feet. This bridge accounts for most of the water in the town. No very great damage was done; one highway bridge destroyed, two railroad bridges damaged, and many houses flooded but not destroyed. * * *

Fort Wayne is situated at the junction of the St. Marys and St. Joseph Rivers, forming the Maumee, which flows into Lake Erie at Toledo. The recent flood came out of the St. Marys, and a rumored failure of the St. Marys Dam of the Grand Reservoir caused a considerable panic. The narrow waterway, encroachments on the stream, and bridges backed the water up so that a large volume flowed over to the Little River Basin, and thence into the Wabash. Some of the water also left the St. Marys above the town along the drainage ditches and passed over a divide into the Maumee River

below town at New Haven. * * * Witnesses testified that water flowed from the St. Marys across this area to a depth of 4 or 5 feet into the Little River of the Wabash system. Undoubtedly this saved Fort Wayne from destruction. The usual bridge and other encroachments prevented the water running off through the usual channel. * * *

* * * All the bridges were too low and too short, and there are many encroachments on that stream as well as islands building in the river. The levee is also too low and too weak. * * *

Logansport.—* * * A large part of the city was inundated and much property damaged, but the current was not sufficient to carry houses off their foundations. The bridges are too low and too short, and in several cases the superstructure was taken from the piers. * * *

Terre Haute.—* * * Across the river West Terre Haute lies on low bottom land. There is a heavy embankment with street and car lines about half a mile long connecting Terre Haute and West Terre Haute, and other embankments for railroads crossing the flat in various directions. These embankments raised the water about 3 feet, according to statements made to us. One railroad embankment protecting part of the town broke, the water rushed through under head, causing the usual destruction. * * *

Mount Carmel.—* * * The Southern Railroad has a bridge and embankment across the flood plain normal to the Wabash River at this place. Considerable embankment was lost, showing that trestles should be used in place of a portion of the embankment.

In general I have to report that it seems that all damage except that due to inundation was caused by encroachments on the streams. If sufficient waterway had been left along the river and its flood plain, some habitations at each point visited would have been inundated, but none would have been moved or destroyed. Vast areas of land have been cleared and put under cultivation that formerly were marshes and forests. Such areas have drainage ditches and smaller drains, and there are large areas underdrained by tile. The result is that the water runs off almost as rapidly as it falls. On the other hand all of the streams in the towns and wherever railroads pass have been damaged by embankments and encroachments, and until this latter condition is changed damage will result during each flood. * * *

OAKWOOD, OHIO.

[Appendix QQ.]

* * * There is a grade crossing at First Street just below which considerable damage was done by the strong currents through this grade crossing.

* * * The railway embankment held back the water causing a difference of level of about 2 feet on either side of the embankment, which was responsible for the damage done along First Street. * * *

OTTAWA, OHIO.

[Appendix OO.]

* * * The valley of the Blanchard is crossed by the bridge and embankment of the Detroit, Toledo & Ironton Railroad at the extreme eastern limit of the town. This embankment served as a dike to protect the city from inundation from that direction and was therefore in the nature of a benefit at this locality, but it seriously retarded the flow of the river and must have proven a detriment to the localities above Ottawa.

Lower down at the foot of Oak Street the river is crossed by a highway bridge which was entirely covered by the water but was not damaged. A square below it is crossed by the Cincinnati, Hamilton & Dayton bridge and the flood section is greatly controlled by the earthen embankment forming the approaches of the bridge. This obstruction backed the water up and caused it to overflow to a depth of about 4 feet a section of the town lying between the Cincinnati, Hamilton & Dayton Railroad and the Detroit, Toledo & Ironton Railroad and south of the Findlay and Fort Wayne branch of the Cincinnati, Hamilton & Dayton Railroad. It is therefore possible that the embankment of the Detroit, Toledo & Ironton Railroad by limiting the area of overflow may have somewhat increased its depth. * * *

Farther down the valley of the river is crossed by the embankment and bridge of the Findlay and Fort Wayne branch of the Cincinnati, Hamilton & Dayton Railroad, greatly reducing the flood section at this point.

As a result of this contraction the water was backed up and overflowed the remaining sections of the town proper. * * *

DEFIANCE, OHIO.

[Appendix PP.]

* * * The Auglaize in the vicinity of the town is crossed by three county bridges and the Baltimore & Ohio Railroad bridge, at each of which the discharge section was unduly contracted. The county bridge at the foot of Hopkins Street was carried away and its central pier overturned. The other bridges were not damaged, although the water was above the floors of the bridges.

The embankment of the Baltimore & Ohio Railroad served as a dike to hold back the water south of the railroad, but the water passing through the grade opening at Frances Street rushed with great velocity down the street, flooded and damaged a number of buildings on the low ground between the street and the river, carried away the county bridge at the foot of Hopkins Street, and cut across the projecting point at the junction of the rivers, where it carried away and damaged a number of store sheds on the low ground adjacent to the river. On the north side of the Maumee opposite the Auglaize considerable damage was done to several sawmills and lumber yards by the swift current caused by the discharge of the Auglaize. * * *

DELAWARE, OHIO.

[Appendix G.]

* * * The damage at Delaware was chiefly due to rapid currents. Forty-eight houses were washed away and nineteen lives were lost. The chief obstructions in addition to encroachments for building purposes were a bridge and embankment of the Big Four Railroad below the town, three road bridges in the city and one highway bridge above the city. An embankment of the Pennsylvania Railroad runs parallel to the river on the side toward the city and performs the useful function of a levee, giving valuable protection to the tracts behind it.

All of the obstructive bridges were carried away by the flood. At the highway bridge above town the pier on the right bank was undermined and destroyed and the superstructure carried away. The three highway bridges in the town, not being fastened down, were lifted from their abutments and wrecked. The most serious obstruction was the Big Four Railroad bridge which had a high embankment crossing the bottom lands on the left bank. This embankment developed a local head of 5 feet as appears from actual levels taken of water marks above and below, as soon as the flood subsided. The resulting current was sufficiently strong to carry the heavy steel trusses of the bridge distances of from 100 to 700 feet downstream. This bridge had three piers in a span of about 300 feet. The center pier was undermined and carried away with the two adjacent spans. The rest of the bridge remained uninjured.

CHILLICOTHE, OHIO.

[Appendix E.]

* * * The river is crossed by the traction line of the electric railway and by the Norfolk & Western Railroad. These, at the entrance to the city, are about 200 yards apart. The bridge of the traction line is above the bridge of the railroad and acted as a dam by arresting drift. The embankment of the railroad was a still better obstruction. The Baltimore & Ohio Railroad ran parallel to the river on the city side. This acted as a levee until it was overtopped and broken.

The damage to Chillicothe was chiefly due to rapid currents. Several houses were washed away and 19 lives were lost. In addition, the city was largely affected by high water. Seventy per cent of the city was under water. The water found access through a narrow gully, a prolongation of Hickory Street. A strong current through the eastern section of the city and particularly through Hickory Street caused erosion and the destruction of buildings. To the east of the city was a levee which was washed away, allowing the river to cross the flats east of the city.

There is a difference of opinion as to the amount of head caused by the embankment of the Norfolk & Western Railroad. Some persons estimate the head as high as 10 feet. Others believe that there was very little head caused at this point. * * *

FREMONT, OHIO.

[Appendix VV.]

* * * The most serious damage was caused by the water backing up south of the Lake Shore embankment and rushing down through the Front Street opening,

regaining the river just above State Street. This damage was further increased by breaks in the embankment just east of the Lake Shore bridge and west of the Wheeling & Lake Erie bridge. This flow continued across State Street east of the bridge and rejoined the river lower down through the east cut-off. * * *

TIFFIN, OHIO.

[Appendix WW.]

* * * The river is crossed by six highway bridges, all of which were washed out. It is crossed by one railroad bridge. The water rose nearly to the top of this bridge, which was held in place by loaded cars. The drainage valley of the Sandusky is crossed by a railroad embankment, which caused the backing up of the water south of the embankment to an elevation approximately 8 feet higher than that on the north side.

In the upper part of the town the water cut across the bends of the river and demolished all of the buildings in the path of the current. North of the embankment the water cut across another bend.

The river section had been unduly contracted by bridge piers, retaining walls, houses, and other encroachments, which contraction proved to be primarily responsible for the damages resulting from the swift current. In the lower section of the river there are two dams 10 to 12 feet in height used to develop power. * * *

TROY, OHIO.

[Appendix M.]

* * * From cross sections made by the city engineer, it was evident that none of the bridges provided enough waterway for even an ordinary flood. This is particularly true of one of the new highway bridges, a low concrete arch structure with two 60-foot and two 70-foot spans. These bridges owe their escape to the fact that the water left the main channel above Troy and covered the flood plain opposite the town.

An embankment of the Cincinnati, Hamilton & Dayton across this flood plain which threatened to back up this flow was cut by the citizens, as was the embankment of the Big Four Railroad which impeded the flow of the water to the west of the town.

The Miami at Troy flows almost due west for about a mile; then it makes a sharp turn and continues its course to the southwest. This curve, together with the fact that the channel is choked with willows and islands of constantly increasing size, appears to be largely responsible for the overflow. * * *

MIAMISBURG, OHIO.

[Appendix K.]

* * * The valley here is perhaps half a mile wide, and the Big Four Railroad crosses it obliquely on a double-track embankment probably 25 feet high, i. e., above general level of flood plain. The Miami River is crossed obliquely by a deck girder bridge on concrete piers. The girders are probably 10 or 12 feet deep, and showed signs of high water at least halfway up. The west abutment and three piers were more or less undermined and tipped over, or out of line, dropping the central part of the bridge several feet. One girder was thrown clear and carried downstream a hundred feet. Traffic is blocked.

At the crossing of the canal and electric road on the east side of the valley the railroad used a two-span truss bridge (skew) on concrete columns and an abutment. The abutment washed out and dropped both of the spans. One of the spans was partly raised on cribbing at the time of our visit, and permitted the electric cars to pass under, but the railroad traffic is blocked.

The high embankment of the Big Four Railroad referred to above is built of rock (fossiliferous limestone), shale, sand, and gravel, apparently from a deep cut nearer Miamisburg. The current, sweeping through the under crossing of the canal and electric road, had apparently washed the stone from this embankment and laid it down in neatly overlapping rows on an adjacent farm. The gravel was farther down on the same farm and carefully sorted. Apparently the embankment had acted as a great earthen dam, and being of substantial material and massive construction, it did not fail under the accumulating waters. The entire volume of water must have been forced through the Miami River bridge and the overhead bridge above the canal and electric road.

* * * We then visited two bridge sites in the town. The superstructure (truss bridges) were gone, but the piers remain uninjured. One abutment on the west end of the lower bridge was washed out. It is reported that the trusses were carried away by wooden bridges which came down the river from points above. * * *

Some signs of encroachment were observed. A row of four houses on the bank between the bridges were washed away, lots and all. One of these is said to have been about 70 years old. There were evidences of filling out into the river in this neighborhood. On the opposite side of the river sand bars covered with a growth of small sycamores may have deflected the current, cut out the houses referred to, and threatened a street of the town, as feared by the mayor.

It seems clear that the long and massive embankment below the town was the primary cause of the extreme high water, which was said to be from 9 to 11 feet higher than the previous record of 1898. This embankment was built within the past few years, and this is its first test by a flood. * * *

CONNERSVILLE, IND.

[Appendix L.]

* * * It appears that the stream is in the process of shifting its channel, and due to the diverting effect of one of the Cincinnati, Hamilton & Dayton abutments the current is being directed against the high ground on the right bank, thereby threatening the city. * * *

MIDDLETOWN, OHIO.

[Appendix J.]

* * * On the opposite or right bank of the river the wide, level valley extends three-fourths of a mile to low hills. This valley or flood plain is occupied by the embankment of the Cincinnati, Hamilton & Dayton Railroad, running parallel to the course of the river one-half mile from it; by the embankment of the Ohio Electric Railroad, crossing the flood plain obliquely; and by an embankment carrying a highway from the Cincinnati, Hamilton & Dayton Railroad across the Miami River bridge into Middletown.

These three embankments constricted the flood channel and confined the river to the bridges and one or more narrow roadway openings. The effects as reported and observed were a piling up of water above the embankments, a torrential flow through the openings, and finally crevassed through the embankments.

The bridge of the Ohio Electric Railroad and the highway bridge were destroyed. The electric road crossed the railroad by an overhead crossing or girder bridge on concrete abutments. The swift currents undermined these abutments, which toppled over and blocked the railroad. * * *

MIAMI VALLEY.

[Appendix I.]

New Baltimore.—* * * The superstructure of the bridge at this place was entirely destroyed. It seemed to be broken in two and the steel work bent and twisted. The upper stones of the abutments, where the bridge was recessed, were displaced and some of them thrown into the river. The stream was filled with large trees and drift, and the water, which had evidently been over the bridge floor, must have banked the debris against the truss and demolished it. A swift current, from 6 to 7 miles an hour, was flowing at the time of the inspection. It was observed that two mills above the bridge had been destroyed. The valley at this point is rather narrow.

Venice.—* * * I proceeded to Venice, walking three-fourths of a mile to the site of the bridge across the river near this place, which is uninjured, but the west approach is entirely washed out and the low grounds in the vicinity badly cut up, in some cases from 8 to 10 feet deep. The valley here is about three-fourths of a mile wide, and the water was probably 12 feet deep over part of the low grounds. The river rose into the town perhaps 1 foot, and several houses on the flood plain were washed out and eroded areas covered with a deposit of gravel. * * *

30. In justice to those who make encroachments on the flood channel it must be stated that in no case that has come before the board has it been shown that the fault was committed intentionally, and in only one instance that has been called to the attention of the board

was antecedent objection made. The drainage basins delivering water to the points in question had areas of from several hundred to several thousand square miles; no adequate studies of the flood possibilities had ever been made, and all development along the river had been based upon insufficient data.

CONCLUSIONS AND RECOMMENDATIONS.

31. The board has reached the decided conclusion that no one method of flood control can be recommended to the exclusion of others. Local conditions vary so greatly between several basins that what is suitable to one stream is likely to be unsuitable for another. In some places (as at Dayton) reservoirs appear to promise good results. The board is informed that this method has been recommended by the engineers employed by the city. In others (as Columbus) a system of levees and increased dimensions with a cut-off is preferred. (See Appendix D.) In other cases, after preliminary examinations, other combinations seem desirable. Therefore the board reports that it is not possible to recommend what method shall be used in each particular stream without knowledge of further facts.

32. These facts are of two main classes: First, those bearing upon the quantity of water to be expected; and, second, those bearing upon the capacity of watercourses to carry it away. The most important of these facts are, of the first class, the greatest run-off from the drainage area, and of the second, the least discharge capacity of the draining stream.

33. Rainfall is known from the records of observing stations such as are maintained by the United States Weather Bureau. The maximum momentary or flood discharge can be determined from the rainfall only by measuring the discharge of the stream and the rainfall which causes it. It is necessary to emphasize this, because it is sometimes erroneously assumed that flood discharge may be computed from rainfall. It can not unless there have been actual measurements coordinating rainfall and stream flow with full consideration of the condition of the ground and all auxiliary conditions. Such coordinated measurements permit the relation between flood discharge, condition of the ground, and rainfall to be established, after which, from a given recorded rainfall the flood to be expected may be computed after an examination of the conditions when it fell. The distribution both in time and area of this rainfall must be recorded. It is true that in the case of an unmeasured stream one may sometimes, in the absence of better information, obtain a figure for percentage of run-off by the argument of analogy with adjacent or similar basins where measurements have been made; but results so obtained are far from trustworthy. Even where measurements have been made the results must be carefully analyzed lest unwarranted conclusions be drawn.

34. Discharge measurements should be made at various stages at a number of places along the streams, particularly in times of high water, and gauges should be established and their readings at the various stages recorded. In this way from given gauge readings the corresponding discharge is sufficiently known, and vice versa. And until such coordinated measurements have been made that it is possible to predict from a given rainfall the volume of flow and height of water at all important points, our knowledge of facts of the first class

is insufficient. For many purposes of flood investigation it might seem that complete knowledge of these facts were not necessary. But in the case of certain methods of flood control, such as reservoirs, complete knowledge of flow at all stages appears to be desirable.

35. Facts of the second class are determined by a survey of the stream and catchment basin. The survey of the stream itself and its flood plain should be fairly detailed and should include frequent cross sections. Less detailed measurements will answer for the rest of the basin, but special attention should be given to possible reservoir sites.

36. To sum up, before making a definite recommendation for any stream the board must have the following data:

(a) A map of the drainage area.

(b) The slope of the stream and a series of cross sections of the stream and flood plain.

(c) Curves of discharge at a number of sections.

(d) Records of rainfall at a number of points in the drainage basin, with the corresponding discharges at critical points on the river in the cases of large discharge.

37. The number of streams having a drainage basin of 100 square miles or more in the basin of the Ohio (omitting the basins of the Cumberland and Tennessee) is 266; for the Erie Basin is 29; a total of 295. This number may be increased when Geological Survey quadrangles are available for areas not now mapped. These are listed in Appendix XX.² For not one of these are complete data available.

38. *Maps.*—For the purposes of the board maps with contour lines are desirable, if not necessary. The maps of the United States Geological Survey are about of the kind desired and, where available, answer the purposes.

39. For the Erie Basin the Geological Survey maps are very nearly completed. The following table will show the status in the Ohio Basin, exclusive of the Cumberland and Tennessee Rivers:

[Maps on scale of 1:62,500.]

State.	Total.	Completed.	Partial.	Untouched.
Illinois.....	66	10	3	53
Indiana.....	135	11	1	123
Ohio.....	140	119	3	18
Pennsylvania.....	77	45	1	31
West Virginia.....	91	68		
Do.....		123		
Virginia.....	32	3		3
Do.....		126		
North Carolina.....	5	15		
Kentucky.....	145	25	4	76
Do.....		138		
Tennessee.....	5			5
New York.....	14	8		6
Maryland.....	4	4		
	714	385	12	717

¹ These areas are mapped on the scale of 1:125,000—30-minute areas.

The above areas are all 15-minute areas.

40. It will be seen that about 45 per cent of the necessary work remains to be done. It was hoped that a great deal of valuable information could be derived from county and city surveyors and officials

² Not printed.

of like kind. Accordingly, 368 letters were sent to such persons. Up to date 54 replies¹ have been received, and the quality of the information contained indicates that the board can expect little of value from this source. Many maps of streams are to be found in the several district offices of the Corps of Engineers. These, however, it is found, are mostly confined to the river itself and the immediate vicinity, and although very valuable, do not show enough of the general drainage area. For this territory the board must rely upon such general maps as are available. It may be remarked that the board does not propose to do work of such nature as the United States Geological Survey is doing on its maps. Work of this kind would better be left to that organization.

41. Slope and cross sections are available only for the following streams:

Wabash River, in part.
Allegheny River, in part.
Monongahela River, in part.
West Fork River, in part.
Youghiogheny River, in part.
Ohio River, in part.
Little Kanawha River, in part.

There appears to be no stream in the area considered for which complete curves of discharge have been made.

42. The board has investigated the subject of gauging stations in the Ohio Valley, exclusive of the Cumberland and Tennessee Rivers, and the Lake Erie Basin, and it finds that in this area there are 153 stations at which gauge heights alone are recorded. These are listed in Appendix YY.¹ There are 65 stations at which both gauge heights and discharge records are kept. These are listed in Appendix ZZ.¹ The records of these stations are available and will be used. In order to collect the data necessary for the proper study of stream flow in this area it is desirable that additional gauging stations be established as shown in Appendix AAA.¹ The establishment of these additional stations will be taken up with the United States Geological Survey and the various State organizations with a view of getting as many new stations as possible from the United States and State funds now available. After this has been done it may be desirable to ask for an additional allotment for this purpose. The subjects of maps and stream-flow data have been discussed freely with the United States Geological Survey, which has given the board valuable advice and assistance. We are agreed that it is very desirable to avoid any duplication of work in this section and to this end each organization should keep the other informed of both present progress and future plans.

43. The records kept by the United States Weather Bureau give all necessary rainfall data for the territory covered by these stations. However, for the proper study of the entire district additional stations must be established. There are now 334 rainfall stations established and maintained by the United States Weather Bureau. A list of these is given in Appendix BBB.¹ After consultation with the Weather Bureau it has been determined that 50 new stations are necessary for the purposes of the board. A list is also given in Appendix CCC.¹ This list has been submitted to the Chief of the

¹ Not printed.

Weather Bureau in Washington and is approved by him. The Weather Bureau has already the proper organization for establishing rainfall stations and keeping the proper records. It would seem that the necessary additional stations should be established and maintained by this bureau.

44. It therefore clearly appears that a great deal of work remains to be done. This work should be done progressively and systematically and a beginning should be made with the tributaries. The problem of the Ohio itself can not be adequately treated until some method of flood control has been adopted for the tributary streams. No further progress can be made without actual prosecution of work in the field, and the board recommends that this be undertaken as soon as possible. The following tentative program of operations is recommended:

45. The present work of collecting information and coordinating results should be continued in the Pittsburgh office. In addition to this at least one party in each of the districts (Pittsburgh, Wheeling, Cleveland, first Cincinnati, second Cincinnati, and Louisville) should be kept continuously employed in making investigations and drawing up a definite plan for each of the larger streams. For example, in the Pittsburgh district a beginning would be made with the Cheat River, for which almost complete information is believed to be available, and a definite plan worked out for the total prevention of floods, or, if this prove to be too expensive, for their control within reasonable limits. This being finished, the Tygarts Valley River would be taken up, measurements made in the field to supply such information as might be lacking, and a plan for this river also devised. In this way the larger tributaries of the Monongahela would be treated in succession. It would then probably be found that the problem of the Monongahela itself had been largely solved, and a complete system for this stream could be worked out. When work of a similar nature had been done for the Allegheny in turn, the problem of floods on the upper Ohio could be intelligently attacked. From our present knowledge we believe that two or three important streams could be treated in each district, or a total of 15 to 18 in all the districts, in each year, and the expense of procedure recommended would not be great.

46. *Estimate.*—The preliminary estimate of cost for this work is as follows:

Cost of headquarters.....	\$20,000
Cost of one party for each district, \$10,000, six districts.....	60,000
	80,000

47. It is necessary to state that without the data referred to or the means of acquiring them the board will be unable to accomplish anything of value beyond giving general advice.

For the board:

FRANCIS R. SHUNK,
Lieutenant Colonel, Corps of Engineers,
Senior Member, Board of Officers on River Floods.

(Appendixes A to CCC not transmitted.)

RELIEF OF AMERICANS IN MEXICO.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

RECOMMENDING

AN APPROPRIATION FOR THE PURPOSE OF PROVIDING MEANS TO
BRING TO THEIR HOMES IN THE UNITED STATES AMERICAN
CITIZENS NOW IN MEXICO.

APRIL 22, 1914—Read, referred to the Committee on Appropriations, and ordered to
be printed.

To the Senate and House of Representatives:

In view of the exigency created by the existing situation in the Republic of Mexico, I recommend the immediate passage by the Congress of an act appropriating \$500,000, or so much thereof as may be necessary, to be placed at the disposal of the President for the purpose of providing means to bring to their homes in the United States American citizens now in Mexico.

WOODROW WILSON.

THE WHITE HOUSE, April 22, 1914.

Q

UNITED STATES PUBLIC HEALTH SERVICE

THE CARE OF THE BABY

PREPARED BY A COMMITTEE OF THE AMERICAN ASSOCIATION
FOR THE STUDY AND PREVENTION OF INFANT MORTALITY
AND PRESENTED TO THE ASSOCIATION AT ITS ANNUAL
MEETING HELD IN WASHINGTON, D. C.,
NOVEMBER 14-17, 1913

SUPPLEMENT No. 10
TO THE
PUBLIC HEALTH REPORTS

DECEMBER 19, 1913



APRIL 24, 1914.—Ordered to be printed

WASHINGTON
GOVERNMENT PRINTING OFFICE
1914



THE CARE OF THE BABY.

At the second annual meeting of the American Association for the Study and Prevention of Infant Mortality, held at Chicago in November, 1911, a committee was appointed to prepare an educational leaflet and booklet on the essentials of infant feeding and hygiene. The committee as appointed consisted of:

Dr. H. J. Gerstenberger, Cleveland, chairman.
Dr. John Howland, St. Louis (now of Baltimore).
Dr. Fritz B. Talbot, Boston.
Dr. Henry F. Helmholz, Chicago.
Dr. J. H. Mason Knox, jr., Baltimore.
Dr. P. J. Sedgwick, Minneapolis.

The following members were later added to the committee:

Dr. J. W. Schereschewsky, United States Public Health Service.
Dr. Herman Schwarz, New York.
Dr. T. B. Cooley, Detroit.

The committee presented its report at the meeting of the association held at Cleveland, October 2 to 5, 1912. The booklet and leaflet which they had prepared were read during the meeting and adopted. The leaflet was later published by the association. The publication of the booklet was delayed to allow its further consideration and revision by the committee. Both booklet and leaflet are subject to revision at each annual meeting of the American Association for Study and Prevention of Infant Mortality in order that they may contain the best recent information in regard to the care of infants.

The booklet as finally presented to the association at the fourth annual meeting held in Washington November 14 to 17, 1913, follows:

I. Some Important Truths.

1. It is easier, better, and cheaper to prevent than to cure disease.
2. Everything that protects the mother before her baby is born improves the health of the baby after its birth.
3. Many of the diseases observed in older children and adults begin in infancy.
4. Healthy babies make strong men and women.
5. The baby's food, home, and surroundings play an important part in keeping it well or making it sick.
6. Mother's milk is the best food for babies.
7. Cow's milk which has become infected with disease germs kills many babies.
8. Extreme heat and impure air kill many babies in the summer, especially bottle-fed babies.
9. The health and happiness of the whole household are improved by everything done to protect the baby.

II. General Suggestions for the Care and Feeding of Infants.

MOTHER'S MILK—NATURE'S FOOD.

1. The most loving act a mother can do is to nurse her baby. When the baby nurses, it not only gets the best food, but it is less liable to many diseases, such as "summer complaint," convulsions, and tuberculosis. Out of every 100 bottle-fed babies an average of 80 die in the first year, while of the breast-fed babies only about 7 out of every 100 die in the first year.

2. Nearly every mother can nurse her baby during the first 3 or 4 months of its life, and if she can nurse it for 10 months, so much the better.

3. There may be an abundant supply of milk after the first few weeks, even if there is but little at first; the act of suckling causes the milk to come into the breasts, and increases the supply. It is very important that the baby nurse regularly.

4. If the baby is too weak to nurse, a healthy infant can be used to excite the flow of milk until the baby has grown strong enough to nurse. This should not be done without a physician's advice.

5. The only way to tell how much food the baby is getting is to weigh it before and after each nursing for at least 24 hours. The clothes need not be removed, but the baby should be dressed in exactly the same way when weighed after nursing as before. (If the baby should soil its diaper after the first weighing do not change it until after the second weighing.) In case the baby is not getting enough breast milk, the quantity lacking should be made up by properly prepared cow's milk. Let a physician decide this. This may be only a temporary shortage on the mother's part, and with suitable care the milk will probably increase so that the baby will eventually be satisfied with the breast only.

6. The following things influence the milk supply: Peace of mind is necessary for the mother; she must not worry; she should not get overtired. She should eat freely of her customary diet. The total quantity of fluids taken by her in 24 hours should not be less than 2 quarts; in hot weather more. Stuffing, however, is unnecessary and undesirable.

7. Consumption in the mother is practically the only disease that always forbids nursing. Paleness, nervousness, fatigue, pains in the back and chest, or the return of the monthly sickness are not sufficient reasons for weaning, but when these symptoms are present or pregnancy ensues a physician should be consulted at once.

8. Shortly after birth, boiled water, without sugar, may be given to the baby at regular intervals until the mother's milk supply is established. The baby, however, should be put to the breast at stated times, as often as the mother's condition permits.

Important Points to be Remembered in Nursing the Baby.

It is always wise to make nursing as easy as possible for the mother and to give her opportunities for rest. Therefore, the sooner the baby is satisfied and gaining on three-hour or even four-hour intervals the better.

Convenient hours for nursing the baby are as follows:

(1) Seven nursings in 24 hours: 6 a. m., 9 a. m., 12 noon, 3 p. m., 6 p. m., 9 or 10 p. m., and once during the night.

(2) Six nursings in 24 hours: 6 a. m., 9 a. m., 12 noon, 3 p. m., 6 p. m., and at the mother's bedtime; or at 6 a. m., 10 a. m., 2 p. m., 6 p. m., 10 p. m., and once during the night.

(3) Five nursings in 24 hours: 6 a. m., 10 a. m., 2 p. m., 6 p. m., 10 p. m., or later.

The baby should be offered cooled boiled water between feedings, especially during hot weather.

The length of time for a nursing varies with the individual and the breast. The average infant rarely nurses longer than 15 minutes. The important point is to satisfy the baby. If there is any doubt, let it nurse longer, but not more than 20 minutes. If it is not satisfied after 20 minutes, consult a physician.

It is customary to nurse only one breast at each feeding, and to use them alternately. If, however, the baby does not get enough from one breast, give it both.

It is important to keep the nipples clean; they should be washed before each nursing. Caked breasts or cracked nipples are the usual causes of breast abscesses, and although they may be harmful to the mother, they do not make the milk poisonous for the baby. In both instances consult a physician.

III. Weaning.

The baby should be completely weaned at the end of the first year. Up to this time breast milk should be given to the baby as long as it thrives. It is better, when possible, to continue nursing through the summer and to wean in the fall. It is better to wean in the summer than in the spring, if by doing so the baby can have breast milk longer.

Do not wean the baby suddenly; it should be done gradually by replacing one breast feeding at a time with a bottle feeding. Several weeks are required for weaning.

It is dangerous to wean a young baby. It should not be done for the convenience of the mother and should never be done without the advice of a physician.

Contagious disease in the mother does not mean that it is necessary to wean the baby. In case of severe illness, contagious or otherwise,

a temporary weaning may be necessary for the mother's sake. A physician should decide this. As soon as the mother's condition permits, the baby should be put back on the breast. The supply of breast milk can sometimes be brought back by putting the baby regularly to the breast for several days, even when nursing has been stopped for several weeks.

IV. Mixed Feeding.

When the mother's milk is diminishing it is advisable to make up the lack with properly prepared cow's milk. This may be done either by following one or more breast feedings with enough modified milk to satisfy the baby or by giving one or more full bottle feedings in place of a like number of breast feedings.

The flow of breast milk tends to diminish when the baby nurses less than five times in 24 hours. When the baby is being nursed once every 4 hours and is not satisfied, it is better to give him after nursing enough modified milk to satisfy him, rather than to replace a nursing with the bottle. If, on the other hand, shorter intervals and more feedings are being used, a bottle feeding may take the place of a nursing without so much danger of decreasing the milk supply. Most babies need additional food after the seventh month.

V. Bottle Feeding.

Cow's milk is the most satisfactory substitute for mother's milk. The best milk (this does not mean the richest milk) is none too good. Get "certified" milk if possible. If you can not obtain certified milk, get the cleanest and purest bottled milk you can find. Milk sold in bulk, or bottled from the can in stores, or by milkmen in their wagons, is likely to be stale and contaminated and not a proper food for the baby, even though it looks and tastes good. "Baby foods" and condensed milks and the like are not satisfactory substitutes for good cow's milk, and often harm the baby.

Raw milk may carry the germs of tuberculosis, scarlet fever, tonsillitis, diphtheria, typhoid, and other communicable diseases. Unless the milk is above suspicion, danger should be prevented by proper pasteurization of the milk or by boiling or by sterilization.

Pasteurization.—Pasteurization means heating the milk to about 150° F. for 30 minutes and then rapidly cooling it. Milk for the baby should always be pasteurized in the feeding bottle. It may be done as follows: The milk should be mixed and poured into the clean feeding bottles, which should then be stopped with clean, non-absorbent cotton. It is then ready for pasteurization. While a number of satisfactory pasteurizers may be bought in the shops, a home-made pasteurizer can be easily constructed.

Take a wire basket that will hold all the nursing bottles for 24 hours and place this basket containing the bottles in a vessel of cold water filled to a point a little above the level of the milk. Heat the water and allow it to boil for five minutes. Then run cold water into the vessel until the milk is cooled to the temperature of the running water. The milk is then put into the ice chest, which should be not warmer than 50° F.

Sterilization.—By sterilization of milk is meant the process of rendering it germ free by boiling it on 3 successive days or by keeping it for 15 minutes under pressure at a temperature of 242° F.

Boiling.—Milk is boiled for one or two minutes in a large vessel and poured immediately into the sterilized bottles, stoppered with cotton, rapidly cooled in running water, and put on the ice. This destroys all living bacteria but not spores or eggs, which will not do harm unless the milk is kept too long after boiling. It should be used within 24 hours.

If the baby's milk is to be mixed with other ingredients, such as oatmeal, barley water, rice water, sugar, etc., these should be added to the milk before pasteurization, boiling, or sterilization. When the milk is once prepared the bottle should not be opened until it is given to the baby.

Preservation of the baby's milk.—After the baby's milk has been prepared, it is very important that it should be kept cold until it is used.

A simple ice box can be made as follows: Procure a wooden box about 18 inches square and 12 inches deep. Get two tin boxes, one about 11 inches square and 9 inches deep, the other 10 inches square and 9 inches deep. Cracker boxes will do. Cut the bottom out of the larger box. Place 3 inches of sawdust in the wooden box. Put the larger bottomless box upon the layer of sawdust and fill the space between the wooden and the outer tin box with sawdust. Fasten the pieces forming the lid of the wooden box together with cleats nailed on the outer surface. Tack about 50 layers of newspapers cut to the size of the wooden box to the inner surface of the lid. Make hinges for the lid by tacking two strips of leather onto the outside of the box and then tack additional strips of leather to the front edge of the lid to catch on nails driven into that side of the box, in order to hold the lid down tightly. The ice box is now ready for use. Into the smaller tin box put your wire basket containing the filled and stoppered nursing bottles (or a quart and a pint bottle of milk) and surround them with cracked ice. Place the smaller tin box inside the larger and close the lid. Each morning remove the inner box, pour out the water, clean, and repack with ice. Keep the ice box in a cool, shady place.

This ice box, if properly cared for, and kept full of ice, will keep a day's supply of milk cool and sweet.

Precautions to be Observed in Preparing the Baby's Food.

Everything that comes in contact with the baby's food must be clean. The hands should be washed with hot water, soap, nailbrush, and dried with a clean towel before touching anything that goes into the baby's mouth. The dishes used in preparing the food should be boiled and allowed to dry from their own heat. Do not use a dish towel.

Bottles.—As soon as the baby has finished his feeding throw out any remaining milk, rinse the nursing bottle, and fill it with cold water. When ready to prepare the milk for the next 24 hours, empty the bottles, wash them thoroughly with hot soapsuds and a bottle brush, and then rinse and boil them for 15 minutes. The bottles are then ready for filling.

Nipples.—Only nipples that can be kept clean easily should be used. They should be turned inside out, scrubbed, cleansed, and boiled. After boiling they should be kept covered in a clean, dry glass. Dirty nipples should not be kept with clean ones. Never use nipples connected with long glass or rubber tubes.

Directions for the Bottle Feeding of Babies.

Complete instructions for bottle feeding can not be given in a booklet like this. Babies that are artificially fed should be under the supervision of a physician, who should see them at regular intervals. Very young babies, or those that are not thriving, should always be seen once a week, while older healthy babies should be seen at least once a month, whether they are sick or well. The following rules and suggestions apply to all bottle-fed babies:

Before feeding warm the food to blood heat by putting the bottle in a vessel of warm water. Do not test the temperature of the milk by putting the nipple in your own mouth, but sprinkle a few drops on the inner surface of your arm. Be careful not to allow the food to become too hot and see that it does not cool too much while the baby is nursing. This can be prevented by wrapping the bottle in a piece of flannel.

Hold the bottle for the baby throughout the feeding. Do not coax the baby to take more food than it wants, and do not allow it to drink longer than 20 minutes from the bottle. If it takes longer, there is something the matter with the baby or with the nipple.

If there is any food left in the bottle, throw it away; do not give it to the baby later.

Convenient feeding hours are the same as those for the breast-fed babies. (See p. 5.)

When the baby has diarrhea, either with or without vomiting, stop all food at once. Give it one or two teaspoonfuls of castor oil,

allow it to have plenty of boiled water to drink, and send for a physician immediately. Save the soiled diapers for the physician to examine. (Always keep them covered.)

If the baby refuses to drink unsweetened, cooled, boiled water, give it barley or oatmeal water.

Be sure to wash the hands thoroughly after changing a diaper and before preparing food. Boil all the soiled diapers for half an hour to kill the dangerous germs which might spread the diarrhea among the other members of the household. Keep the diapers in a solution of strong disinfectant (2 tablespoonfuls of pure carbolic acid in 2 quarts of warm water) in a covered vessel until ready to boil.

VI. The Home.

The welfare of the baby depends largely upon the condition of its home and surroundings.

Fresh air.—A satisfactory home for a baby should provide plenty of fresh air and sunshine. Much of the baby's time should be spent out of doors after it is 3 months old, on a porch or in the yard. A healthy baby should be kept out of doors at least four hours each day, even in winter except when it is colder than 22° F. During the summer a newly born baby may be taken out of doors in the first week. During the winter months the baby should be gradually accustomed to the outside air. A good plan is to begin with an outing of 15 minutes at noon and gradually lengthen the time into the forenoon and afternoon, until the baby is out from 10 a. m. until 2 p. m. The baby must be properly clothed, according to the weather.

The surroundings of the home should be free from uncovered garbage, rubbish, and manure. All of these attract flies and other disease-carrying insects.

VII. The Baby's Room.

A quiet room if possible with a south or southwesterly exposure should be given to the baby. It should be well ventilated at all times. An open fireplace is desirable. The room should contain no upholstered furniture or heavy curtains. The walls and floors should be so finished as to allow frequent wiping with a damp cloth. A porch adjoining the baby's room and running water near by are desirable. The temperature of the baby's room should be kept not higher than 68° or 70° in winter and in summer should be kept as cool as possible with awnings and shutters. The windows should be kept open day and night in summer, and in winter the room should be aired two or three times a day. The windows and doors should be screened against flies and other disease-carrying insects. In the absence of screens, mosquito netting may be tacked on the outside of the windows. The cellar of the house should be dry.

VIII. Clothing.

Improper clothing may be harmful to babies in three ways: First, by being so tight that it prevents normal movements; second, by keeping the baby too warm; and, third, by not keeping it warm enough. The first fault can be avoided by making all of the baby clothes loose and roomy. Do not put on so many clothes that the baby perspires. All clothing except the shirt band and diaper may be removed in very hot weather. As the weather grows cooler, other clothing is added. The important thing for the mother to remember is that the baby is very sensitive to both heat and cold. She must be constantly on her guard to keep the baby cool enough in summer and warm enough in winter. The principal object of clothing is to insure a uniform body temperature. Loosely woven material should be used to allow proper ventilation for the skin. The use of a flannel bellyband is necessary until the cord drops off. After the first month it may be replaced by a knitted band with shoulder straps.

List of Clothes for Newly Born Baby.

Three flannel binders ($\frac{3}{4}$ yard of 27-inch flannel).

Three shirts, wool and silk, or wool and cotton.

Two flannel petticoats.

Two flannel or knitted sacques.

Two pairs of worsted socks.

Two dozen diapers, 22 by 44 inches.

One dozen diapers, 25 by 50 inches.

Four white muslin slips.

One cloak.

One warm cap.

One pair of mittens.

One veil.

Two blankets.

One box talcum powder.

Two dozen safety pins, large and small.

Two bath towels.

Two soft towels.

LATER.

Three pairs of woolen stockings.

Three knitted bands with shoulder straps.

Additional diapers.

IX. Sleep.

Every baby needs 20 hours of sleep a day in its first month and not less than 16 up to the twelfth month of its first year. It should sleep alone, not in a cradle, but in a crib. If no crib is available, a clothes basket or a box of sufficient size is a good substitute. An expensive mattress is not necessary. A simple mattress made of excelsior and covered with a heavy blanket will answer very well. A sufficient quantity of clean bed clothing should be provided.

The room should be darkened and well ventilated; the windows should always be open at the top at least 6 inches, except in the coldest weather. If the baby cries when it should be asleep, it is probably sick, overfed, or hungry.

All children should take a nap of from one to two hours in the middle of the day until they are 6 years old.

X. The Bath.

Every baby should be bathed at least once a day; during the hot weather two or three sponge baths may be given in 24 hours. The temperature of the bath should be from 90° to 95° F. in the early months. By the end of the first year the temperature may be lowered to 80° to 85° F. If you have no thermometer, a practical test for the correct temperature is to use water that feels warm to the elbow.

When bathing the baby in a tub let it rest upon your left arm, which is slipped under its back from the baby's right side. By grasping the baby under the armpit with the left hand a good hold is secured which prevents slipping. The right hand is left free for washing the baby. A special wash cloth, preferably of cheese cloth, should be provided for washing the baby's face and head.

After the baby is taken out of the tub it should be dried in a large soft bath towel.

Do not wash a healthy baby's mouth; it will do no good and may do harm. As soon as the baby has teeth, clean them carefully with a soft clean cloth or gauze, and later with a soft toothbrush and cooled, boiled water.

After the baby is dressed it is wise to keep it indoors for at least an hour after bathing and to protect it from drafts.

The best time for bathing the baby is just before its morning feeding, between 8 and 10 o'clock. After its bath the baby will be ready to take its food and go to sleep.

XI. Weighing the Baby.

The baby should be weighed regularly at least once a week for the first year and the record of the weight kept in a book. The most convenient time for weighing the baby is before the regular bath in the morning. It is well to remember that the record of the baby's gain in weight will be reliable only if it has been weighed at the same hour each time.

XII. The Normal Baby.

An average healthy baby weighs from 7 to 7½ pounds at birth; 15 pounds at 5 or 6 months, and 21 pounds at 12 months. In other

words, the baby doubles its weight in 6 months and trebles it in 12 months.

It is 20 to 21 inches long at birth, 25 to 26 inches at 6 months, and 28 or 29 inches at 12 months.

More rapid gains are noted in the first 6 months than in the second 6 months. The average weekly gain is about 4 ounces.

It sleeps soundly.

Is happy, active, and enjoys using its arms and legs freely.

Begins to follow moving objects with its eyes at the second or third month.

Begins to sit unsupported at the seventh or eighth month.

Cuts its first tooth from the sixth to ninth month; has about 6 teeth at 12 months, 12 teeth at 18 months, 16 teeth at 24 months, and 20 teeth at 30 months.

Walks from the fourteenth to the seventeenth month.

The soft spot or opening in the skull closes between the eighteenth and twenty-fourth month.

Begins to say words like "papa" and "mamma" after the twelfth month, and simple, short sentences at the close of the second year. Children, however, that are otherwise perfectly normal may not begin to speak until a year later than the time stated above, or may present variations from any of the above.

XIII. Contagious Diseases.

The spread of most contagious diseases is caused through ignorance or carelessness. Inasmuch as contagious diseases often can not be distinguished from the noncontagious, it is wise to separate children from every sick person, young or old, until the true nature of the illness is known. If the disease is contagious, the separation must be kept up. This separation consists in placing the patient in a room by himself and giving him separate wash cloths, towels, and dishes. One person only should care for the patient, and the clothing of this person should be protected by a gown or long apron or sheet when in the patient's room. After caring for or handling the patient, the caretaker's hands should be carefully washed with warm water and soap.

Every person should cooperate to the fullest extent with the local department of health in its efforts to limit the spread of communicable diseases. Do yourself what you would desire of another parent whose child might be a source of danger to your own family.

So-called colds, such as running nose, sore throat, bronchitis, and the like are easily communicated to children and may be especially serious for the baby.

Do not sneeze or cough in the baby's face. A mother should protect the baby from catching her own cold by tying a handkerchief

or piece of cheesecloth over her nose and mouth when nursing or caring for her baby. She should not kiss the baby.

Tuberculosis very often gets its start in infancy. Every effort, therefore, should be made to protect the baby from infection. Common ways of infecting the baby are by kissing it, coughing or sneezing near the child, or by allowing it to sit on the floor where it has a good chance to pick up tuberculosis germs with the dust on its toys or other objects and thus get them into its mouth. It is a good plan to have a separate room or at least part of a room fenced off as the baby's play room, and to cover the floor with a clean sheet each day. Milk from tuberculous cows may also be the cause of tuberculosis in the baby.

XIV. Eye Disease and Blindness.

Many babies within two or three days after birth, occasionally later, have what is commonly known as "sore eyes" or, as the mothers say, "have caught cold in their eyes." The proper name for this condition is ophthalmia, and it is caused by a germ getting into the eyes during the baby's birth. The eyelids become reddened and swollen and in a very few hours pus is seen in abundance. All such cases must be energetically and skillfully treated at once by trained physicians. Neglect and carelessness may result in the loss of the baby's sight. The condition can usually be prevented if the physician puts a drop of a proper antiseptic in each eye immediately after the birth.

XV. Vaccination.

Do not forget that the earlier the child is vaccinated, the sooner it is protected against smallpox. In this country it is not possible to know when and where an outbreak of smallpox will take place. It is well, therefore, to be prepared.

The best time to have a baby vaccinated is in its first year. If the baby is healthy it may be vaccinated as early as the third or fourth month.

XVI. Birth Registration.

See that your doctor registers your baby's birth as soon as possible after it is born. Birth registration secures citizenship and may save future legal trouble.

XVII. Pre-Natal Care.

By this is meant the care and advice given to the mother before the birth of the baby, in order that she may fit herself to bear and to care for it.

There is no doubt that the welfare of the baby depends largely upon the mother's health and that many mothers would be better

able to nurse their babies if they had proper care, food, clothing, and exercise before the babies were born.

In order to secure the proper advice as early as possible, every prospective mother should consult a physician as soon as she knows she is to have a baby. If she can not afford the services of a physician, she should apply to a maternity hospital or dispensary where competent physicians and nurses are ready to advise and care for her until the baby is born.

If, for any reason, the prospective mother can not see a competent physician at least once a month during her pregnancy she should send a specimen of her urine to him regularly each month. During the last two months of pregnancy she should see her physician or send him a specimen of her urine every two weeks. She must drink enough liquid so that she will pass at least 3 pints of urine each 24 hours. Her bowels should move once a day. Persistent or sudden and severe headaches, swelling of the face or hands, increasing swelling of the ankles must be reported at once to the physician in charge. Any appearance of blood from the vagina demands instant summoning of the physician. As soon as a woman knows she is pregnant she should go to the dentist and have her teeth put in good condition.

The above statements are the merest outlines of the fundamental care which every woman should have. It must be remembered that if the prospective mothers are intelligently supervised and will report all untoward symptoms at once deaths and disabilities of both mothers and children will be less frequent.

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STATISTICS OF COASTWISE TRAFFIC THROUGH PANAMA
CANAL.

LETTER

FROM THE

ACTING SECRETARY OF COMMERCE,

SUBMITTING

DRAFT OF A BILL TO FACILITATE THE PROCUREMENT OF STA-
TISTICS OF THE COASTWISE TRADE OF THE UNITED STATES
PASSING THROUGH THE PANAMA CANAL.

APRIL 25, 1914.—Referred to the Committee on Interstate and Foreign Commerce
and ordered to be printed.

DEPARTMENT OF COMMERCE,
OFFICE OF THE SECRETARY,
Washington, April 22, 1914.

SIR: I have the honor to recommend that the necessary legislation be enacted to provide for the furnishing of detailed statistics of coastwise traffic that will pass through the Panama Canal with the completion of that new waterway. It is believed that there will be very great interest in the coastwise shipping which will use the canal.

At the present time the Department of Commerce receives from collectors of customs of the various ports of the United States information showing in detail the quantities, kinds, and values of the various commodities shipped between the Atlantic and Pacific coast ports by way of the Isthmuses of Panama and Tehuantepec. Collectors are enabled to secure this information by reason of the fact that vessels carrying shipments via these routes clear for foreign ports, and are therefore required to file shippers' manifests, as provided in section 4200, Revised Statutes, which applies to vessels bound for foreign ports. Upon the opening of the Panama Canal, however, vessels sailing between Atlantic and Pacific coast ports will not clear for foreign ports, and such vessels, under existing law, will only be required to file ordinary coastwise manifests, which do not contain the detailed information needed for statistical purposes. Under existing law it will be impossible to obtain the necessary data.

It is therefore recommended that amendment be made to sections 4197 to 4200, Revised Statutes, inclusive, similar to the act of April 29, 1902 (37 Stat., 172), which was enacted to facilitate the procurement of statistics of trade between the United States and its non-contiguous territory, in order to compel shippers using the canal to furnish the detailed information referred to. A draft of a proposed bill intended to accomplish this purpose is inclosed herewith.

Respectfully,

E. F. SWEET, *Acting Secretary.*

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES,
Washington, D. C.

A BILL To facilitate the procurement of statistics of the coastwise trade of the United States passing through the Panama Canal.

Be it enacted, That the provisions of sections four thousand one hundred and ninety-seven to four thousand two hundred, inclusive, of the Revised Statutes of the United States, requiring statements of quantity and value of goods carried by vessels clearing from the United States to foreign ports, shall be extended to and govern, under such regulations as the Secretary of the Treasury and the Secretary of Commerce shall prescribe, in the coastwise trade of the United States passing through the Panama Canal.



SIXTH INTERNATIONAL CONGRESS OF CHAMBERS OF COMMERCE
AND COMMERCIAL AND INDUSTRIAL ASSOCIATIONS.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

A REPORT FROM THE SECRETARY OF STATE, BEING AN INVITATION FROM THE GOVERNMENT OF THE FRENCH REPUBLIC TO SEND DELEGATES TO THE SIXTH INTERNATIONAL CONGRESS OF CHAMBERS OF COMMERCE, ETC.

APRIL 25, 1914.—Referred to the Committee on Foreign Affairs and ordered to be printed.

To the Senate and House of Representatives:

In view of a provision contained in the deficiency act approved March 4, 1913, that "hereafter the Executive shall not extend or accept any invitation to participate in any international congress, conference, or like event without first having specific authority of law," I transmit herewith, for the consideration of the Congress and for its determination whether it will authorize the acceptance of the invitation and the appropriation necessary to defray the expenses incident thereto, a report from the Secretary of State, with accompanying papers, being an invitation from the Government of the French Republic to that of the United States to send delegates to the Sixth International Congress of Chambers of Commerce and Commercial and Industrial Associations, to be held at Paris from the 8th to the 10th of June, 1914, and a letter from the Department of Commerce showing the favor with which that department views the proposed gathering and recommending an appropriation of not to exceed \$2,000 to defray the expenses of participation by the United States.

WOODROW WILSON.

THE WHITE HOUSE, April 25, 1914.

The PRESIDENT: On March 18, 1914, the ambassador of the French Republic at this capital, acting under instructions from his Government, conveyed to the Government of the United States an invitation to be represented by delegates at the Sixth International Congress of Chambers of Commerce and Commercial and Industrial Associations, to be held at Paris in June, 1914. This invitation with its accompanying program was communicated to the Secretary of Commerce, who, in a letter dated April 8, 1914, advised me that the congress is deemed of very considerable importance by the Department of Commerce, and that inasmuch as the Fifth International Congress of Chambers of Commerce was held at Boston in September, 1912, it would be unfortunate if appropriate official recognition should not be made by the United States of the meeting to be held at Paris in June next.

In recommending that an application be made to Congress for the necessary authority to accept the invitation extended by the Government of the French Republic, the Secretary of Commerce states that it is believed that at least three delegates, to be designated by the Secretary of the Treasury, the Postmaster General, and the Secretary of Commerce, should attend the meeting, and he suggests that an appropriation of not to exceed \$2,000 would be necessary to pay the expenses of these official representatives.

The Executive being prohibited by a provision of the deficiency act approved March 4, 1913, from accepting an invitation of this nature without specific authority of law, I have the honor to submit the papers herewith to the end that, should you approve, they may be transmitted to Congress for that body to determine whether it will authorize the acceptance of the invitation and will provide the appropriation which the Secretary of Commerce thinks will be required for United States representation in this international congress.

Respectfully submitted.

W. J. BRYAN.

Inclosures:

From the French ambassador, March 18, 1914, with inclosures.
From the Secretary of Commerce, April 8, 1914.

DEPARTMENT OF STATE,
April 22, 1914.

[Translation.]

EMBASSY OF THE FRENCH REPUBLIC,
Washington, March 18, 1914.

Mr. SECRETARY OF STATE: I have the honor to inform your excellency that the Sixth International Congress of Chambers of Commerce and Commercial and Industrial Associations is to be held this year at Paris from the 8th to the 10th of June. The meeting is placed under the high patronage of the President of the Republic and the presidency of members of the Government.

The president of the council, minister of foreign affairs, wishes me to ask the Federal Government to be represented at the congress by official delegates.

If, as is my Government's hope, the invitation should be favorably received, I should be much obliged to your excellency if you would

let me know as soon as possible the names and addresses of the delegates designated by the United States Government.

Your excellency will find herewith several copies of the program of the congresses under consideration.

Be pleased to accept, Mr. Secretary of State, the assurances of my high consideration.

JUSSERAND.

His Excellency the Hon. W. J. BRYAN,
Secretary of State of the United States, Washington, D. C.

ORDRE DU JOUR DU CONGRÈS INTERNATIONAL DES CHAMBRES DE COMMERCE ET DES ASSOCIATIONS COMMERCIALES ET INDUSTRIELLES, QUI DOIT SE TENIR À PARIS EN JUIN 1914.

Cet ordre du jour a été provisoirement fixé comme suit:

1. Rapport du Bureau sur la suite donnée aux résolutions des précédents Congrès, notamment dans les questions de la date de Pâques, de la fixité du calendrier et des statistiques douanières.
2. De l'utilité d'une action internationale contre la concurrence déloyale, dans le sens des législations existantes.
3. De l'unification des législations relatives à la procédure d'arbitrage pour régler les litiges entre citoyens de pays différents.
4. De l'unification des lois sur les warrants en vue de faciliter, d'étendre et de mieux garantir le crédit sur marchandises.
5. Projet d'étude comparative des polices d'assurances en trafic international (à titre documentaire et en vue d'améliorer leur rédaction).
6. Projet de type uniforme de connaissance, quant aux conditions générales, pour les lignes concédées ou régulières de navigation à vapeur, afin d'empêcher des contradictions, des surprises ou des incertitudes.
7. Chèques postaux et virements postaux internationaux.
8. Unification des législations sur le chèque (pour rapport du Comité de Londres)
9. Modifications et additions au règlement des Congrès internationaux des Chambres de Commerce, voté à Milan en 1906.

DEPARTMENT OF COMMERCE,
OFFICE OF THE SECRETARY,
Washington, April 8, 1914.

SIR: I have the honor to acknowledge the receipt of your communication of the 4th instant, inclosing an invitation from the French Republic to the Government of the United States to be represented by delegates at the Sixth International Congress of Chambers of Commerce and Commercial and Industrial Associations, to be held at Paris from the 8th to the 10th of June, 1914, and requesting to be informed whether the Department of Commerce considers this congress of sufficient interest to warrant an application being made to Congress for authority to accept the invitation and also to appropriate the amount necessary for such representation.

The congress in question is deemed of very considerable importance by this department, and it is earnestly recommended that application be made by the Department of State to Congress for the necessary authority to accept the invitation of the French Republic. It is believed that at least three delegates should be sent to the meeting, and it is further suggested that the Treasury Department, the Post Office Department, and the Department of Commerce should designate delegates. It is further suggested that an appropriation of not to exceed \$2,000 would be necessary to pay

the expenses of these official representatives. The Fifth International Congress was held in Boston in September, 1912, and was a very important gathering; and the Department of Commerce deems that it would be unfortunate if appropriate official recognition should not be made by the United States of the meeting in Paris in June next.

Respectfully,

WILLIAM C. REDFIELD,
Secretary.

The SECRETARY OF STATE,
Washington, D. C.



PREVENTION OF EPIDEMIC DISEASES.

L E T T E R

FROM

THE SECRETARY OF THE TREASURY,

REQUESTING

THAT THE SUM OF \$100,000 BE APPROPRIATED BY JOINT RESOLUTION OR OTHERWISE, TO BE IMMEDIATELY AVAILABLE FOR USE IN THE PREVENTION OF THE INTRODUCTION AND SPREAD OF EPIDEMIC DISEASES.

APRIL 28, 1914.—Referred to the Committee on Appropriations and ordered to be printed.

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, April 25, 1914.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to state that the fund for the prevention of the introduction and spread of epidemic diseases for the present fiscal year is nearly exhausted. The danger to this country from the introduction of yellow fever, smallpox, and typhus fever is greatly augmented on account of the arrival of refugees and persons returning from Mexico to our ports, and sufficient funds should be available to meet the emergency.

I have, therefore, the honor to request that the sum of \$100,000 be immediately appropriated by joint resolution or otherwise, to be instantly available and to continue available until expended.

Respectfully,

W. G. McADOO,
Secretary.

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RED LAKE RESERVATION, MINN.

L E T T E R

FROM

THE SECRETARY OF THE INTERIOR,

TRANSMITTING

A REPORT OF THE DRAINAGE SURVEY OF THE RED LAKE DIMINISHED RESERVATION, MINN.

MAY 22, 1914.—Ordered to be printed, with illustrations.

DEPARTMENT OF THE INTERIOR,
Washington, April 20, 1914.

MY DEAR MR. STEENERSON: In compliance with your request of April 17, I transmit herewith for your information copy of the report submitted by the United States Geological Survey on the drainage survey of the Red Lake Diminished Reservation, Minn., executed under the provisions of the Indian appropriation act approved June 30, 1913.

Cordially, yours,

FRANKLIN K. LANE.

HON. HALVOR STEENERSON,
House of Representatives.

REPORT ON THE DRAINAGE SURVEY OF THE RED LAKE DIMINISHED RESERVATION, MINN.

A survey of the swamp lands of the Chippewa Indians in northern Minnesota was authorized by act of Congress June 30, 1913, the object being to determine whether such lands may not be profitably and economically reclaimed by drainage and converted to agricultural uses.

A similar survey of the ceded lands of the Chippewa Indians was made in 1906, 1907, 1908, and a report, including map, tables, ditching plans, and estimates was submitted in House Document No. 607 to the second session of the Fifty-ninth Congress, covering an area of about 630 square miles lying east and north of Thief River Falls. An additional report was submitted in House Document No. 27 to the first session of the Sixty-first Congress, covering an area of over

4,000 square miles, lying principally between Red Lake and the international boundary. That survey was preliminary in character and consisted practically of thousands of spirit-level determinations covering the area in such a way as to establish the divides between drainage basins and the general slope or grade of the land. Many permanent bench marks were established which will be of value in starting future surveys.

The township and subdivision surveys of the General Land Office represent the ground control upon which the topographic features determined by the survey of 1913 were shown. Since the first surveys were made there has been a great development in actual drainage construction under State and county supervision in the ceded land area, particularly to the east of Thief River Falls and extending to the boundary of the present diminished reservation.

The plan of drainage construction as outlined in House Document No. 607 (2d sess. 59th Cong.) and shown on the map accompanying same, has been followed in a general way by the engineers in charge of the work, who have expressed their appreciation of the data and plans and estimates furnished by the Government survey.

Within the district they have constructed about 550 miles of ditches, the same number of miles of good roads, with 1,800 culverts and 22 steel bridges, providing at least one-half mile of ditch bordering each quarter section, also contributing \$62,000 to the improvement of Thief River, at a total cost of about \$3 per acre. Agricultural development and increased land values have rapidly followed these improvements.

The swamp lands within the boundaries of the Indian reservation are similar in character to those outside which are already drained, and it is safe to assume that they will have equal value when converted to agricultural uses.

The survey of the Chippewa Indian Reservation has been of the same general character as that of the ceded lands above mentioned. The drainage of this area presents no difficult problems. The Red Lake and Clearwater Rivers afford a natural outlet for the surface and ground waters. The accepted method of excavation is by one or more of the different types of dredges. In the following plans there are but two long ditches, each about 24 miles in length, and both to the north of Red Lake River. Short laterals and local ditches draining into the rivers named fill the intervening area.

The plans and estimates given herewith are preliminary in character, and cover drainage only, not road construction nor the building of bridges. A more detailed survey would be necessary to properly locate ditches and establish grades, but it is believed the general plan would be about the same and that the actual number of cubic yards excavated and the final cost would be within the estimates.

In determining the size of ditches, a variable coefficient for run-off has been used, the run-off for small areas being proportionately greater than for large areas. A plan frequently used, and one which has given satisfactory results in completed drainage projects, is to provide for a run-off in each 24 hours equivalent to three-eighths inch for a drainage outlet of 10 square miles, one-fourth inch for an outlet of 25 square miles, and three-sixteenths inch for an outlet of 200 square miles. For an area of 25 square miles such ditches would have a capacity for a mean monthly run-off of $7\frac{1}{2}$ inches, or 60 per cent greater than the mean monthly rainfall in that region occurring

during the month of greatest rainfall. The heaviest rainfall recorded in any month, as shown by the precipitation records from 1899 to 1908, was 10.63 inches, in August. Supposing a maximum monthly rainfall of 12 inches and a run-off of 50 per cent, or 6 inches, the ditch capacity would still exceed the run-off by $1\frac{1}{4}$ inches.

Farm laterals to reach each quarter section of land have been provided for in the estimates. These will not be over 2 miles in length. Two sizes have been used, each with a bottom width of 3 feet and slopes of 1 to 1, one being 3 and the other 4 feet in depth and containing, respectively, 3,520 and 5,475 cubic yards per mile.

The main ditches are estimated at 13 cents per cubic yard, which is about the price for which dredge work is being done in adjacent territory. The smaller ditches and some of the laterals are estimated at 15 cents. The total area for which it seems desirable to provide drainage is 370 square miles, or 236,800 acres. The total estimated cost is \$369,680, or an average of about \$1.56 per acre, which is exclusive of any assessment of these lands that might be deemed equitable as a portion of the cost of the improvement of Red Lake River, should such improvement be found necessary. This estimate is less than it would be if there were no main outlet channels, such as the Red Lake and Clearwater Rivers afford.

No survey was made of that portion of the reservation lying south of the lower Red Lake and east of the Clearwater-Beltrami County line, nor of that portion between the upper and lower lake. These areas consist mostly of high timbered sand ridges and scarcely any swamp area, and have therefore not been considered in the foregoing drainage plans.

The question has arisen as to the effect of the proposed drainage of the Indian lands upon those just west of the reservation which are contiguous to Red Lake River. It would undoubtedly result in increasing the burden of water carried by the river, whose current is sluggish and banks low in many places, and this condition might be detrimental if not destructive to the agricultural development of these lands. It is obvious that in the improvement of the Indian lands it would not be right to cause damage or destruction to the lands outside the reservation.

The run-off from Indian lands already finds its way into Red Lake and Red Lake River and there would be no greater annual run-off after than before drainage improvement, yet the construction of ditches would provide a much quicker means of run-off and would result in an increased flow during any flood period. It would seem, therefore, that there may be some foundation for the fears of white settlers who occupy lands below the Indian reservation along the Red Lake River.

At the present time the ditches already constructed in Red Lake and Marshall Counties extend eastward to the reservation line, and in Beltrami County, on the north side of the reservation, these ditches extend eastward parallel to the reservation boundary for a distance of 15 to 18 miles from the west boundary. It is not the intention to burden the capacity of any of these ditches by diverting any of the water from the reservation into them. Some of the drainage will be into the Clearwater River, but nearly all will be into the Red Lake River, and by constructing a ditch near the west boundary of the reservation, south into Red Lake River, the adjacent lands of white settlers on the west will be benefited by taking

away from them the water which naturally finds its way in that direction. Probably one or more townships would be so benefited. The only people, therefore, whose lands might be harmed by the proposed drainage plans are those who live near the Red Lake River from the reservation line to High Landing, a distance of about 18 miles. Below High Landing the banks are probably sufficiently high to provide ample drainage for adjacent lands. The area outside the reservation thus subject to overflow can not be definitely stated without a more detailed survey, but can be approximately stated at 10,000 acres.

There are two possible plans for the relief of congested conditions in this river during flood periods. The capacity may be increased by dredging the present channel, and there are several opportunities to reduce the distance and increase the grade by cut-offs. From the outlet of Red Lake to the reservation line, a distance of 19 miles, there is a fall of little more than 6 inches per mile. In the next 14 miles there is a fall of about 0.9 foot per mile. For this distance the river is bordered by swampy banks whose elevation is nearly the same as the river. No measurement of run-off has ever been taken at the outlet, but approximately from the records at Thief River Falls and Crookston the maximum flood run-off at this point may reach as much as 5,000 cubic feet per second. With a grade of 6 inches per mile a channel sufficiently large to contain this volume of water within its banks would have a bottom width of 150 feet, a depth of 11 feet, and slopes of 1 to 1. To care for one-half this volume on the same grade would require a channel 90 feet wide on bottom and 10 feet deep. The expense would render impracticable the construction of so large a channel. The best that could be done would be to improve the present channel so as to assist the run-off and care for the water at ordinary stages. An estimate of the cost of such improvement can not be made with the data at hand, but may be roughly approximated at \$4,000 per mile for a distance of 30 miles, or a total of \$120,000.

A cheaper and more effective plan may be found in the construction of a storage dam at the outlet of Red Lake impounding the entire run-off or so much as may be necessary from an area of 2,000 square miles.

Red Lake is formed by two bodies of water connected by a narrow channel. The combined area is 440 square miles. The depth of water may be increased from 2 to 5 feet without in any way injuring or flooding the surrounding land. On the south and west shores the water is very shallow and where docks have been established they have had to be extended recently because of the falling of the lake level. From October, 1907, to October, 1913, there was a fall of 17 inches, as shown by elevations taken at those dates.

The benefits of storage would be felt in the aid to navigation on the lake, some aid to navigation on Red River of the North, increased water power on Red Lake River, complete protection from floods on the same river, and some aid in reducing flood waters of the Red River.

During a period of 28 months, from May, 1899, to August, 1901, gauging records were taken by the United States Army Engineers at a point about 5 miles above Thief River Falls. During the period the annual rainfall was about 30 inches, or somewhat in excess of the average rainfall for that section. The average monthly run-off was

about 2,500,000,000 cubic feet, or an equivalent to an annual run-off of 5½ inches in depth over the drainage basin of 2,400 square miles. Assuming an annual rainfall of 30 inches and a run-off of 20 per cent, or 6 inches, there would be a total of 28,000,000,000 cubic feet, all of which could be withheld in the reservoir without raising the lake level more than 27 inches. The retention of this vast volume of water, allowing a gradual run-off, would effectually relieve the congestion in Red Lake River during flood periods.

In a report on the water resources investigation of Minnesota it is estimated that a dam at the outlet of Red Lake would have a length of 400 feet at the water surface, 950 feet at 2 feet elevation, and 1,050 feet at 4 feet elevation. A dam 4 feet above the lake level would probably cost not over \$10,000. If it should be considered necessary to provide for navigation on Red Lake River and Red Lake, then a lock and dam would be required and the cost greatly increased. According to a report of the United States Engineer Corps, the cost of such a lock and dam would be \$65,000, the necessary dredging of river and lake \$180,000, and plant and equipment \$25,000, or a total of \$270,000.

The project was not approved by the Chief of Engineers, who stated that the amount of commerce itself would not warrant the expenditure of so large a sum of money. Later reports on the same project have confirmed this opinion.

In the years before the building of the International & Great Northern Railway and the line from Bemidji to Red Lake the only possible way to reach the Red Lake country was by way of Red Lake River. Several small steamers and some gasoline boats plied the river, carrying freight and passengers up and bringing back logs, lumber, and passengers. The maximum freight and passenger traffic was in 1899, when 997 tons of freight and 5,944 passengers were carried. The number of passengers that year was nearly five times greater than any other year. The maximum log and lumber traffic was in 1904, when 115,000,000 feet were brought down. The amount declined gradually to 31,000,000 feet in 1911. In 1910, 300 tons of freight and 600 passengers were carried. In 1911, on account of low water, there was no steamboat nor launch traffic, and there has been none since. An electric line now runs from Thief River Falls eastward for 16 miles and is under construction to the reservation line. Other lines are projected which will give an outlet to all farm products to the immediate west and north of Red Lake. With the advent of electric and steam roads in the near future it seems most probable that the need and demand for river navigation will cease.

The timber available in this region which might naturally find its way down Red Lake River is practically exhausted, with the exception of that on Indian land. Here there are approximately 125,000,000 feet b. m., of which 50 per cent is white pine. Whether this timber should eventually be taken down the river or sawed at some point on Red Lake matters little. Provision can easily be made for running logs through a sluiceway.

Leaving the question of river navigation out of the reckoning, we find an easy and economical solution of the problem of floods on Red Lake River in the construction of a storage dam at the lake outlet.

On the accompanying map there is outlined a system of main drainage ditches into which the smaller farm laterals are to drain.

In the northwest half of township 154 north, range 38 west, there are about 10,000 acres for which no specific drainage plans have been made. These lands, which are naturally drier than the usual swamp areas, have been considerably improved by the construction of ditches just outside the reservation, but adjacent to the north and west boundaries of the township. With the construction of ditches on the east and south it is believed there will be little need for any ditch construction on this area, unless it be the smaller type of farm lateral.

The following tables give the dimensions and excavation quantities for all ditches and the summary showing the number of miles of farm laterals for each general drainage area.

AREA NORTH OF RED LAKE RIVER.

The area drained by main ditches Nos. 1 and 2 lies north of Red Lake River and west of Red Lake and a high ridge, in range 36, extending north from Red Lake. It occupies the northwest corner of the reservation. Of a total area of about 153,000 acres all but about 20,000 are swamp land and easily reclaimable.

Main ditch No. 1 and laterals.

Ditch No.:	Section.	Length.	Area drained.	Dimensions.		Slope.	Grade per mile.	Velocity (feet per second).	Cubic yards.
				Width, bottom.	Depth.				
		Miles.	Sq. miles.	Feet.	Feet.		Feet.		
1.....	A.....	2.0	5.0	8.0	3.5	1 to 1....	2.00	1.84	15,740
1.....	B.....	2.0	9.0	10.0	4.0	..do....	2.00	2.00	21,910
1.....	C.....	3.0	13.0	10.0	4.5	..do....	1.70	2.00	38,280
1.....	D.....	2.0	24.0	11.0	5.0	..do....	2.00	2.35	31,290
1.....	E.....	2.0	35.0	13.0	5.5	..do....	2.00	2.56	39,800
1.....	F.....	2.0	44.0	15.0	5.5	..do....	2.00	2.70	44,100
1.....	G.....	2.0	54.0	17.0	6.5	..do....	1.33	2.40	59,740
1.....	H.....	1.0	59.0	18.0	6.5	..do....	1.33	2.45	31,140
1.....	I.....	2.0	61.0	19.0	6.5	..do....	1.25	2.40	64,830
1.....	J.....	2.0	71.0	20.0	6.5	..do....	1.50	2.65	67,370
1.....	K.....	2.0	81.0	20.0	7.0	..do....	1.50	2.80	73,920
1.....	L.....	2.0	91.0	19.0	5.5	..do....	5.00	4.32	55,400
Laterals:									
1.....	A.....	1.0	3.0	4.0	3.5	..do....	2.00	1.57	5,130
1.....	B.....	2.0	7.0	10.0	3.5	..do....	2.00	1.85	18,480
1.....	C.....	2.0	8.5	12.0	3.5	..do....	2.00	1.90	21,220
2.....	A.....	2.0	7.0	10.0	3.5	..do....	2.00	1.85	18,480
2.....	B.....	2.0	8.5	12.0	3.5	..do....	2.00	1.90	21,220
3.....	A.....	2.0	6.0	10.0	3.5	..do....	2.00	1.85	18,480
3.....	B.....	2.0	7.5	12.0	3.5	..do....	1.50	1.67	21,220
4.....	A.....	1.0	4.0	6.0	3.5	..do....	2.00	1.70	6,500
4.....	B.....	2.0	6.0	10.0	3.5	..do....	1.85	1.78	18,480
5.....	A.....	2.0	3.0	8.0	3.5	..do....	1.05	1.30	15,740
6.....	A.....	2.0	5.0	10.0	3.5	..do....	1.32	1.50	18,480
6.....	B.....	2.0	8.0	12.0	4.0	..do....	1.32	1.67	26,080
7.....	A.....	2.0	5.0	10.0	3.5	..do....	1.32	1.50	18,480
7.....	B.....	2.0	8.0	12.0	4.0	..do....	1.05	1.50	25,080
8.....	A.....	1.0	5.0	8.0	3.5	..do....	1.05	1.30	7,570
8.....	B.....	1.5	8.0	8.0	3.5	..do....	2.00	1.80	11,810
									822,170

Cost of excavation, at 13 cents per yard..... \$106,880

Farm laterals, 36 linear miles, 3 by 3 feet (slope 1 to 1), at 3,520 yards per mile, 126,720 cubic yards;
cost of excavation at 15 cents..... 19,010

Engineering and contingencies, 10 per cent..... 125,880
12,588

Total..... 138,498

Area, 90 square miles, or 57,600 acres.
Average cost, \$2.40 per acre.

Main ditch No. 2 and laterals.

	Section.	Length.	Area drained.	Dimensions.		Slope.	Grade per mile.	Velocity (feet per second).	Cubic yards.
				Bottom width.	Depth.				
Ditch No.:		Miles.	Sq. miles.	Feet.	Feet.		Feet.		
2.....	A.....	1.0	5.0	6.0	3.5	1 to 1....	4.00	2.40	6,500
2.....	B.....	2.0	9.0	10.0	4.0	do.....	2.00	2.00	21,900
2.....	C.....	2.0	12.0	10.0	4.0	do.....	2.00	2.10	21,900
2.....	D.....	2.0	15.0	14.0	4.0	do.....	1.50	1.90	28,160
2.....	E.....	2.0	17.0	14.0	4.0	do.....	1.50	1.95	28,160
2.....	F.....	2.0	19.0	14.0	3.5	do.....	3.17	2.50	23,960
2.....	G.....	3.0	32.9	14.0	4.5	do.....	2.90	2.80	48,840
2.....	H.....	2.0	45.0	19.0	5.5	do.....	1.50	2.40	53,090
2.....	I.....	2.0	57.0	20.0	6.0	do.....	1.50	2.50	61,016
2.....	J.....	1.5	69.0	20.0	7.0	do.....	1.00	2.30	55,440
2.....	K.....	3.0	75.0	18.0	5.5	do.....	3.83	3.80	75,830
Main laterals:									
1.....	A.....	2.0	6.0	8.0	3.5	do.....	3.17	2.26	15,740
1.....	B.....	2.0	10.0	8.0	4.0	do.....	3.43	2.52	18,770
2.....	A.....	2.0	3.0	4.0	3.5	do.....	3.43	2.07	10,270
2.....	B.....	2.0	8.5	6.0	4.5	do.....	2.90	2.40	18,480
2.....	C.....	2.0	12.5	10.0	5.0	do.....	1.10	1.70	29,330
3.....	A.....	2.0	5.0	6.0	3.5	do.....	2.64	2.15	12,000
3.....	B.....	3.0	10.0	7.0	4.5	do.....	2.38	2.80	80,360
4.....	A.....	2.0	6.0	6.0	4.0	do.....	2.64	2.12	15,640
4.....	B.....	3.0	10.0	8.0	5.0	do.....	1.32	1.80	88,120
									614,510

Farm laterals and local ditches:

38 miles 3 by 3 feet, at 3,520 yards per mile..... 133,760
 8 miles 3 by 4 feet, at 5,475 yards per mile..... 43,800

Summary:

614,510 cubic yards, at 13 cents..... \$79,886
 177,560 cubic yards, at 15 cents..... 26,634

Engineering and contingencies, 10 per cent..... 106,520
 10,650

Total cost..... 117,170

Area of swamp land drained, 117 square miles, or about 74,880 acres.

Average cost per acre: \$1.57.

H D-63-2-vol 158-28

The area between Red Lake and Clearwater Rivers contains about 75,000 acres and is practically all swamp land, but can be drained by local ditches emptying into these rivers and into Red Lake. No ditch would be over 5 or 6 miles in length.

Area between Red Lake and Clearwater Rivers.

	Section.	Length.	Area drained.	Dimensions.		Slopes.	Grade per mile.	Velocity (feet per second).	Cubic yards.
				Width, bottom.	Depth.				
Ditch No.:		Miles.	Sq. miles.	Feet.	Feet.		Feet.		
1.....	A.....	1.50	3	6.0	3.0	1 to 1....	1.32	1.40	7,920
1.....	B.....	1.00	4	6.0	4.0	do.....	1.05	1.40	7,820
1.....	C.....	1.00	5	6.0	3.5	do.....	3.17	2.20	6,500
2.....	A.....	1.00	2	4.0	3.0	do.....	2.10	1.30	4,100
2.....	B.....	2.00	3	4.0	3.0	do.....	2.90	1.70	8,210
2.....	C.....	1.50	6	8.0	3.5	do.....	2.64	2.10	11,810
3.....	A.....	2.00	4	6.0	3.0	do.....	2.64	1.80	10,580
3.....	B.....	2.00	8	8.0	4.0	do.....	2.38	2.10	18,770
3.....	C.....	1.50	11	8.0	4.0	do.....	5.28	3.10	14,080
4.....	A.....	2.00	5	8.0	3.5	do.....	2.00	1.80	15,680
4.....	B.....	2.00	7	8.0	3.5	do.....	4.75	2.70	15,580
5.....	A.....	2.00	5	8.0	3.5	do.....	1.05	1.35	15,580
5.....	B.....	1.00	6	6.0	3.5	do.....	8.00	3.15	6,500
6.....	A.....	1.00	3	6.0	3.0	do.....	2.90	1.90	5,280
6.....	B.....	2.00	4	8.0	3.5	do.....	1.60	1.60	15,580
6.....	C.....	1.00	5	6.0	3.5	do.....	6.60	2.90	6,500
7.....		2.00		4.0	3.0	do.....			8,210
8.....	A.....	3.00	19	11.0	5.0	do.....	1.05	1.80	46,930
8.....	B.....	1.30	21	8.0	5.0	do.....	2.38	2.50	16,820
9.....		2.00	7	6.0	4.0	do.....	2.64	2.20	15,640
10.....	A.....	1.00	4	6.0	3.0	do.....	2.90	2.10	5,280
10.....	B.....	1.75	5	6.0	3.0	do.....	3.40	2.30	9,240
11.....		2.50	5	6.0	3.0	do.....	3.70	2.30	13,200
12.....		1.75	4	6.0	3.5	do.....	2.40	1.90	11,380
									296,700

Main ditches, cubic yards 296,700
 15 miles laterals 3 by 4 feet (1 to 1 slope at 5,475 yards per mile) 82,120
 33 miles laterals 3 by 3 feet (1 to 1 slope at 8,520 yards per mile) 116,160

Total 494,980

At 15 cents per yard equals \$74,247
 Engineering and contingencies, 10 per cent. 7,423

Total 81,670

Area drained, 118 square miles or 75,520 acres.
 Average cost per acre, \$1.08.

In townships 153 and 154 north, range 35 west, there are about 29,000 acres of swamp lands desirable for reclamation. All the drainage would be into Red Lake through several local ditches.

Area north of Red Lake.

	Section.	Length.	Area drained.	Dimensions.		Slope.	Grade per mile.	Velocity (feet per second).	Cubic yards.
				Width, bottom.	Depth.				
Ditch No.:		<i>Miles.</i>	<i>Sq. miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		
1.....	A.....	2.00	4.0	4.0	3.0	1 to 1....	4.75	2.45	8,210
1.....	B.....	2.00	7.0	7.0	3.0	...do.....	5.00	2.80	11,780
1.....	C.....	.60	8.0	6.0	3.0	...do.....	9.24	2.67	2,640
2.....	A.....	2.00	6.0	8.0	3.0	...do.....	2.90	2.17	12,910
2.....	B.....	1.00	8.0	8.0	3.5	...do.....	3.17	2.45	7,870
2.....	C.....	.75	8.5	7.0	3.0	...do.....	6.60	3.20	4,400
3.....	A.....	1.50	3.0	5.0	3.0	...do.....	1.32	1.33	7,040
3.....	B.....	1.50	4.0	5.0	3.0	...do.....	5.28	2.70	7,040
4.....	A.....	2.00	20.0	7.0	4.0	...do.....	6.60	3.70	17,210
4.....	B.....	3.00	30.0	12.0	4.0	...do.....	3.70	3.10	25,030
4.....	C.....	3.80	38.0	12.0	5.0	...do.....	2.10	2.60	14,670
4.....	D.....	4.30	43.0	14.0	5.0	...do.....	2.60	3.00	37,150
									155,900

15 miles of farm laterals, at 3,520 yards per mile..... 82,800

155,900

208,700

114,640 yards, at 15 cents..... \$17,196

94,060 yards, at 13 cents..... 12,224

Total..... 29,420

Engineering and contingencies, 10 per cent..... 2,940

32,360

Forty-five square miles drained, or 28,800 acres, at average cost of \$1.13 per acre.



THE MILITARY POLICY OF THE UNITED STATES

DURING THE MEXICAN WAR

BY

Bvt. Maj. Gen. EMORY UPTON

United States Army

[Extract from Senate Document No. 494, Sixty-second Congress, Second Session]



WASHINGTON
GOVERNMENT PRINTING OFFICE
1914

(H. Res. 493.)

IN THE HOUSE OF REPRESENTATIVES,

May 9, 1914.

Resolved, That there be reprinted as a separate document, for the use of the House of Representatives, three thousand copies of chapter fifteen of the military policy of the United States, by General Emory Upton, entitled "The Military Policy of the United States during the Mexican War," being pages one hundred and ninety-five to two hundred and twenty-two, inclusive, of Senate document Numbered Four hundred and ninety-four, Sixty-second Congress, second session; one thousand copies of the same to be distributed through the folding room of the House and two thousand copies through the document room of the House.

Attest:

SOUTH TRIMBLE; *Clerk.*

■

THE MILITARY POLICY OF THE UNITED STATES DURING THE MEXICAN WAR.^a

Palo Alto, Resaca de la Palma, Monterey, Buena Vista, the siege and capture of Vera Cruz, Cerro Gordo, Contreras, Churubusco, and El Molino del Rey contributed an unbroken chain of victories preceding the entrance of our troops into the capital of Mexico.

Successes so brilliant would apparently denote the perfection of military policy, but, paradoxical as it may seem, official documents establish the fact that they were achieved under the very same system of laws and executive orders which in the preceding foreign war had led to a series of disasters culminating in the capture and destruction of our capital.

The explanation of this paradox is to be found partly in the difference of character of our adversaries, but more especially in the quality of the Regular Army with which we began the two wars. For the Mexican war, as for the war of 1812, the Government had ample time to prepare. The admission of Texas into the Union on the 1st of March, 1845, which was ratified by that State on the ensuing 4th of July, was followed in August by the advance of our Army to Corpus Christi.

On the 6th of August the Adjutant-General, by direction of the Secretary of War, wrote to the commander, General Taylor:

Although a state of war with Mexico or an invasion of Texas by her forces may not take place, it is nevertheless deemed proper and necessary that your force should be fully equal to meet with the certainty of success any crisis which may arise in Texas, and which would require you, by force of arms, to carry out the instructions of the Government.^b

He was directed to learn from the authorities of Texas what additional force could, in case of need, be placed at his disposal, and given authority to call them into service, coupled, however, with the economical restriction:

Such auxiliary volunteer force from Texas, when events, not now revealed, may justify their employment, will be organized and mustered under your orders, and be received into the service of the United States when actually required in the field to repel invasion,^c actual or menaced, and not before.

^a Note indorsed upon this chapter in the handwriting of General Sherman was as follows: "I read this before sending to Garfield. I think it very good and suggest no amendment.—W. T. S." And again, in General Garfield's handwriting: "This is very good.—J. A. Garfield."—EDITORS.

^b House Ex. Doc. No. 60, Thirtieth Congress, first session, p. 83.

^c House Ex. Doc. No. 60, Thirtieth Congress, first session, pp. 83, 84.

The same paragraph of this order informed the commander that—

It should be understood that as yet no provision exists by law for the payment of such forces, but appropriations for that purpose will doubtless be made by Congress. * * *

The amount and description of the force to be mustered into the service of the United States is left to your determination, and, of course, to be regulated by circumstances.^a

August 23, 1845, the Secretary of War wrote:

The information hitherto received as to the intentions of Mexico and the measures she may adopt, does not enable the Administration here to give you more explicit instructions in regard to your movements than those which have been already forwarded to you. There is reason to believe that Mexico is making efforts to assemble a large army on the frontier of Texas for the purpose of entering the Territory and holding forcible possession of it. Of their movements you are doubtless advised, and we trust have taken, or early will take, prompt and efficient steps to meet and repel any such hostile incursion. Should Mexico assemble a large body of troops on the Rio Grande and cross it with a considerable force, such a movement must be regarded as an invasion of the United States and the commencement of hostilities. You will, of course, use all the authority which has been or may be given you to meet such a state of things. Texas must be protected from hostile invasion, and for that purpose you will of course employ to the utmost extent all the means you possess or can command. * * *

Should Mexico declare war, or commence hostilities by crossing the Rio Grande with a considerable force, you are instructed to lose no time in giving information to the authorities of each or any of the above-mentioned States^b as to the number of volunteers you may want from them respectively. Should you require troops from any of these States, it would be important to have them with the least possible delay. It is not doubted that at least two regiments from New Orleans and one from Mobile could be obtained and expeditiously brought into the field. You will cause it to be known at these places what number and description of troops you desire to receive from them in the contemplated emergency. The authorities of these States will be apprised that you are authorized to receive volunteers from them, and you may calculate that they will promptly join you when it is made known that their services are required.^c

To "meet with the certainty of success" any crisis that might arise in Texas, the commander was given on paper an aggregate of 4,000 men of the Regular Army, with power to call from States, near and remote, such force of volunteers as in his discretion he might judge expedient.

Three days later, August 26, the Secretary of War informed the Governors of Alabama, Mississippi, and Louisiana by letter that General Taylor had been appointed to command the "army of occupation" and requested him to furnish such a force of militia as General Taylor might designate. August 28 similar letters were sent to the Governors of Kentucky and Tennessee. August 30 the Secretary of War wrote General Taylor:

The instructions heretofore issued enjoin upon you to defend Texas from invasion and Indian hostilities, and should Mexico invade it, you will employ all your forces to repulse the invaders, and drive all Mexican troops beyond the Rio Grande. Should you judge the forces under your command inadequate, you will not fail to draw sufficient auxiliary aid from Texas, and, if there be need, from the States, pursuant to your previous instructions. It is not to be doubted that, on your notification, volunteer troops to the number you may require will rally with alacrity to your standard. You have been advised that the assembling of a large Mexican army on the borders of Texas, and crossing the Rio Grande with a considerable force, will be regarded by

^aHouse Ex. Doc. No. 60, Thirtieth Congress, first session, p. 84.

^bIn addition to Texas these States were Louisiana, Alabama, Mississippi, Tennessee, and Kentucky. See letter Hon. William L. Marcy, Secretary of War, to General Taylor, August 23, 1845.—*Errors*.

^cHouse Ex. Doc. No. 60, Thirtieth Congress, first session, pp. 84, 85.

the Executive here as an invasion of the United States and the commencement of hostilities. An attempt to cross the river with such a force will also be considered in the same light. * * *

In case of war, either declared or made manifest by hostile acts, your main object will be the protection of Texas; but the pursuit of this object will not necessarily confine your action within the territory of Texas. Mexico having thus commenced hostilities you may, in your discretion, should you have sufficient force and be in a condition to do so, cross the Rio Grande, disperse or capture the forces assembling to invade Texas, defeat the junction of troops uniting for that purpose, drive them from their positions on either side of that river, and, if deemed practicable and expedient, take and hold possession of Matamoras and other places in the country. I scarcely need to say that enterprises of this kind are only to be ventured on under circumstances presenting a fair prospect of success.^a

The full significance of these orders should not escape our attention. They not only contemplated the possibility of an invasion, but going far beyond, they looked to a bold and aggressive war to be prosecuted by the same class of troops as were called out at the beginning of the war of 1812.

But this was not all. In plain violation of the Constitution, which only authorizes the employment of militia "to execute the laws of the Union, suppress insurrections, and repel invasions," the orders, in case the General saw fit to call out the militia, sanctioned his entrance into a foreign country with troops of this description. As had already occurred in our history, such a force, pleading constitutional limitations, could have abandoned him the moment he crossed the frontier.

Without dwelling on this germ of dissolution in his army, had he called out and sought to rely upon raw troops, let us under his instructions look at the possibility of receiving timely aid in case of need. Corpus Christi is from 100 to 150 miles from the nearest point on the Rio Grande. Half of this distance, had the enemy been prepared, could possibly have been traversed without exciting the alarm of our commander. Five days later our regular forces, numbering on paper but 4,000 men, might have found themselves face to face with the Mexican army, with no option, under the orders, except to give or receive battle. Even had it taken ten days for the Mexican army to move from the Rio Grande to Corpus Christi, it would have been impossible for a single company or regiment of militia to have joined the army, except possibly from Texas.

The want of care and foresight in these instructions to our commanders was soon to receive a more positive proof. On the 4th of October, 1845, General Taylor wrote from Corpus Christi that if the Government, in settling the question of boundary, proposed the line of the Rio Grande as an ultimatum, he could not doubt that the settlement would be facilitated and hastened by taking possession of one or two points on or near the river.^b

This suggestion, submitted with great deference, appears to have been adopted, for on the 13th of January, 1846, the Secretary of War, by direction of the President, instructed him to advance and occupy as soon as practicable "positions on or near the east bank of the Rio del Norte." The Secretary stated in conclusion:

It is not designed, in our present relations with Mexico, that you should treat her as an enemy; but should she assume that character by a declaration of war, or any open act of hostility toward us, you will not act merely on the defensive, if your relative means enable you to do otherwise.

^a House Ex. Doc. No. 60, Thirtieth Congress, first session, pp. 88, 89.

^b House Ex. Doc. No. 60, Thirtieth Congress, first session, p. 108.

Since instructions were given you to draw aid from Texas, in case you should deem it necessary, the relations between that State and the United States have undergone some modification. Texas is now fully incorporated into our union of States, and you are hereby authorized to make a requisition upon the Executive of that State for such of its militia force as may be needed to repel invasion or to secure the country against apprehended invasion.^a

March 2, the Secretary again wrote:

You can not fail to have timely notice of the approach of any considerable Mexican force, and, in that event, will promptly and efficiently use the authority with which you are clothed to call to you such auxiliary forces as you may need. The Governor of Texas has been notified that you are authorized by the President to make a requisition on him for troops, and it is not doubted that he will promptly respond to any call you may make for that purpose.

Your advance to the Rio del Norte will bring you, as a matter of course, nearer to your assailants in case of hostilities, and at the same time remove you to a greater distance from the region from which auxiliary aid can be drawn. This consideration will naturally induce you to take more than ordinary care to be in a safe position and prepared to sustain yourself against any assault.^b

These instructions were still vague. They gave the commander the undoubted authority to call upon Texas at once, but as the use of the militia was qualified by the expressions "to repel invasion," "to secure the country against apprehended invasion," "the approach of a considerable Mexican force," the responsibility of incurring expense was thrown upon the commander, who, under the spirit of his instructions, could do nothing less than await future events.

In the meantime the necessity for increasing the Regular Army as the only means of insuring economy and safety was not lost sight of by the Government. General Scott, in his annual report in November, 1845, recommended the addition of one regiment of artillery and three of infantry, as also an increase of the number of privates per company in all of the existing regiments. His plan for the increase of the rank and file contemplated the addition of 10 privates to each company of dragoons, and 20 to each company of artillery and infantry, still further qualified by his preference for 100 privates per company. By adopting this plan he added:

Our present skeleton Army may then, without an additional regiment and by the mere addition of privates, be augmented 7,960 men (more than doubled), making a total of noncommissioned officers, etc., of 15,843.

I offer but elements. It is for higher authorities to determine the extent (if any) and mode of augmentation. But I may add that companies with but 42 privates cannot be isolated, as the ordinary service of the frontiers so frequently requires, and hence are often doubled to garrison even some of the smaller posts.^c

The Secretary of War in his annual report was not less statesman-like and explicit. After explaining that the concentration of troops in Texas had left the long line of the British frontier guarded by a few posts, that many fortifications on the Atlantic and Gulf coasts were without garrisons, that the troops on the frontier were not more than sufficient to protect the settlements, and that apprehensions and anxiety existed in relation to the abandonment of posts, he continued:

I would respectfully recommend that authority to increase the number of privates in a company, to any number not exceeding eighty should be vested in the President, to be exercised at his discretion, with special reference to what the public interest might suddenly require.

This mode of enlarging the Army, by adding to the rank and file of the present companies, will not, it is believed, impair, but, on the contrary, greatly improve their

^aHouse Ex. Doc. No. 60, Thirtieth Congress, first session, p. 91.

^bHouse Ex. Doc. No. 60, Thirtieth Congress, first session, p. 92.

^cSenate Ex. Doc. No. 1, Twenty-ninth Congress, first session, p. 210.

comparative efficiency, and on that account, as well as on the score of economy, is deemed preferable to that of effecting the same object by raising new regiments at this time.

It is only in view of a probability that a force considerably larger than a permanent peace establishment might soon be required that I should prefer the mode of increasing the Army by raising new regiments, organized on our present reduced scale. This scale is undoubtedly too low for actual service and has nothing to recommend it to a preference under any circumstances but the facility it affords of expanding an army so organized by increasing the rank and file, and of rendering it effective for service in a shorter period than new regiments could be raised, organized, and disciplined. ^a

These reports accompanied the President's message on the 2d of December, 1845. Had Congress acted promptly on their recommendations it would not have been necessary, three months later, to have instructed General Taylor to depend upon raw troops.

However, this officer left Corpus Christi on the 8th of March, established en route a base of supplies at Point Isabel, and reached the Rio Grande on the 28th at a point opposite Matamoras.

The next day he wrote to the Adjutant-General:

The attitude of the Mexicans is so far decidedly hostile. An interview has been held, by my direction, with the military authorities in Matamoras, but with no satisfactory result. Under this state of things I must again and urgently call your attention to the necessity of speedily sending recruits to this army. The militia of Texas are so remote from the border * * * that we can not depend upon their aid. The strength gained by filling up the regiments here, even to the present feeble establishment, would be of very great importance. ^b

The army of occupation on arriving opposite Matamoras, was composed as follows:

"Army of Occupation" on the frontiers of Texas, May, 1846. ^c

Regiments and corps.	Number of companies.	Present.		Aggregate present and absent.
		Officers.	Men.	
OLD ESTABLISHMENT.				
General staff.....		20		20
Second Dragoons.....	7	13	253	368
First Artillery.....	4	17	288	344
Second Artillery.....	4	13	185	217
Third Artillery.....	4	12	187	210
Fourth Artillery.....	4	11	169	205
Third Infantry.....	10	25	372	464
Fourth Infantry.....	10	23	295	388
Fifth Infantry.....	10	18	370	472
Seventh Infantry.....	10	30	345	418
Eighth Infantry.....	10	27	375	488
Total.....	73	209	2,339	3,554

By giving each of the 73 companies 100 privates, which might have been done but for a defect in the law, this force could have been raised from 3,554 to 7,300 men, which, with the full quota of officers, non-commissioned officers, and musicians, would have made this force exceed 8,000. This would have given it an effective strength of nearly 6,000 men present for duty.

While these figures are interesting as showing that the needless exposure of our little army had its origin in faulty legislation, the weakness of its numbers in no way daunted its commander. He knew

^a Senate Ex. Doc. No. 1, Twenty-ninth Congress, first session, p. 195, 196.

^b House Ex. Doc. No. 60, Thirtieth Congress, first session, p. 132, 133.

^c House Ex. Doc. No. 24, Thirty-first Congress, first session, p. 8a—table.

that four-fifths of his officers had received the benefits of professional training at the Military Academy or in the Florida war. Beyond this, he was conscious that the discipline and esprit de corps of his troops had been brought to the highest point by six months of training in the camp of instruction at Corpus Christi. With this preparation and, as has been observed, with practically no authority to increase his force till an invasion should actually take place, the commander was soon destined to confront a large and well-organized Mexican army.

The first collision occurred on the 25th of April, when Thornton's dragoons in a skirmish on the east bank of the river, suffered a loss of 16 killed and wounded. The emergency having come, General Taylor the next day called upon the Governors of Louisiana and Texas for 5,000 volunteers, but, as was to be expected, the call was too late. The enemy had already crossed the river in large force, and was then threatening his line of communication. Loath to abandon his position, he left the Seventh Infantry and two batteries of artillery to garrison Fort Brown, a field work on the left bank of the river, and on the 1st of May marched with the remainder of the army to Point Isabel. Having replenished his trains and provided for the safety of the depot, he began the return march to the Rio Grande on the evening of the 7th. The next day the crisis arrived. The enemy had invested Fort Brown, and at Palo Alto was drawn up in line of battle to dispute his further advance.

The challenge was promptly accepted. At 2 o'clock our troops moved to the attack, and at dark, after a well-contested engagement, were masters of the field. Though beaten, the enemy was not hopelessly demoralized. The next day he gave battle at Resaca de la Palma, but no longer able to resist the ardor of our troops was again defeated and driven in confusion across the Rio Grande.

The force present at Resaca de la Palma numbered 173 officers and 2,049 men, total 2,222, of whom but 1,700 were engaged.^a

The losses in the two battles were 170 killed and wounded.^b

The strength of the enemy was estimated at 6,000, and his losses in killed and wounded at 1,000.

In concluding his official report General Taylor stated:

Our victory has been decisive. A small force has overcome immense odds of the best troops that Mexico can furnish—veteran regiments perfectly equipped and appointed. Eight pieces of artillery, several colors and standards, a great number of prisoners, including 14 officers, and a large amount of baggage and public property have fallen into our hands. The causes of victory are doubtless to be found in the superior quality of our officers and men.^c

The effect of this brilliant initiative was felt to the end of the war. It gave our troops courage to fight against overwhelming numbers, demoralized the enemy, and afforded a striking proof of the truth of the maxim, "That in war, moral force is to physical as three is to one." In all of the subsequent battles our troops were outnumbered two or three to one, yet they marched steadily forward to victory, and for the first time in our history temporarily convinced our statesmen, if not the people, of the value of professional education and military discipline.

The siege of Fort Brown was raised on the evening of the battle of Resaca de la Palma. On the 11th of May General Taylor proceeded

^a General Taylor's official report—Montgomery's *Life of General Taylor*, pp. 160, 161.

^b House Ex. Doc. No. 24, Thirty-first Congress, first session Table B.

^c Montgomery's *Life of General Taylor*, p. 162.

to Point Isabel to arrange for the reinforcements which had begun to arrive. On the 18th, all being in readiness, he crossed the Rio Grande without opposition and closed the campaign by the occupation of Matamoras.

The brilliant victories of the army of occupation in its three weeks' campaign should not make us lose sight of the perils it encountered. The advance to the Rio Grande, it is true, was suggested by the commander, but in adopting the suggestion the only modification of his instructions seemed to make them more ambiguous by changing the emergency for calling out raw troops from "invasion or to secure the country against apprehended invasion," to the still more vague "approach of a considerable Mexican force." As the nearest governor was at least 300 miles away, there was no possibility of receiving reinforcements, even if called for in view of the suggested emergency, inasmuch as the enemy could cross the Rio Grande and fight a battle on the same day. And such, in theory, was the plan of General Arista, the Mexican commander. The passage of the river by General Torrejon on April 24, which led to the skirmish on the 25th and to General Taylor's requisition for militia on the 26th, was to have been followed by the main body of the army with the expectation of cutting our line of communication and forcing our army to immediate battle. Delays, however, in crossing the river retarded the movement till the 1st of May, when the army returned to Point Isabel.

The conflict was thus deferred till May 8, when, as we have seen, the battle of Palo Alto was fought three days before the first reinforcements made their appearance at Point Isabel. This act sufficiently proves the want of reflection which dictated the President's instructions. Had they been transmitted through the general in chief, as is now wisely required by law,^a he could in a measure have been held responsible had he failed to offer his professional advice. But whether or not he was taken into the confidence of the President, the fact still remains that in trying to economize by depending upon raw troops, the orders to our commanders invited a series of disasters from which we were alone rescued by the skill and fortitude of a disciplined army.

Such was the excitement and alarm lest General Taylor's troops should be overwhelmed, that volunteers came forward far beyond the numbers specified in his requisitions. In New Orleans the veteran commander, General Gaines, who in nearly every disturbance since the war of 1812 had called out troops without waiting for instructions from the Government, set to work to organize and equip an army on his own responsibility, the term of enlistment being fixed at six months. So rapidly did he proceed, calling on the governors of Louisiana, Alabama, Mississippi, and Missouri, that, before he could be stopped by being relieved from command, the number of troops sent to General Taylor exceeded 8,000.

The total number of troops who responded to the calls of the two commanders was:

Three months' men.....	1, 390
Six months' men illegally enlisted and held for three months, the legal term of the militia.....	11, 211
Total	12, 601

^a The act of Congress directing that orders to the Army be promulgated through the commanding general was passed March 2, 1867, and was repealed July 15, 1870.—EDITHA.

The number of men received from Louisiana was 5,389. The arrival of these troops after the emergency had passed was attended by other evidences of mismanagement. They had been called to arms and embarked by a stroke of the pen, but when they landed, so destitute were they of equipment and transportation that they were compelled to remain in idleness near their depots of subsistence until discharged from the service. Called out for three months, they returned to their homes without the satisfaction of having fired a shot, their losses by death being 145—but 25 short of those killed and wounded (170) at the battles of Palo Alto and Resaca de la Palma.

MILITARY LEGISLATION DURING THE WAR.

The report of the first skirmish reached the War Department on Saturday, May 9, 1846. On Monday, the 11th, the President sent a message to Congress, then in session, stating that war existed by the act of Mexico, and adding that—

In further vindication of our rights, and defence of the Territory, I invoke the prompt action of Congress to recognize the existence of the war, and to place at the disposition of the Executive the means of prosecuting the war with vigor, and thus hastening the restoration of peace. To this end I recommend that authority should be given to call into the public service a large body of volunteers, to serve for not less than six or twelve months, unless sooner discharged. A volunteer force is beyond question more efficient than any other description of citizen soldiers; and it is not to be doubted that a number far beyond that required would readily rush to the field upon the call of their country. I further recommend that a liberal provision be made for sustaining our entire military force and furnishing it with supplies and munitions of war.

The most energetic and prompt measures and the immediate appearance in arms of a large and overpowering force are recommended to Congress as the most certain and efficient means of bringing the existing collision with Mexico to a speedy and successful termination.^a

In these few brief lines is to be found the primary cause of all the subsequent delay and extravagance attending the prosecution of the war. Ignoring the experience of the Revolution, of the war of 1812, and later still of the Florida war, whose aggregate duration exceeded sixteen years, without pausing to compute, in the absence of railroads, the time required to transport troops from one to two thousand miles to the scene of hostilities, the President not only expressed his confidence in raw troops, but signified his belief in a formal recommendation to Congress that we could bring a foreign war to a successful conclusion in the brief space of from six to twelve months.

The responsibility for this recommendation cannot wholly be laid upon the President. General Taylor, a witness of the feeble and protracted prosecution of the two preceding wars, in his letter reporting the skirmish of Thornton's dragoons, stated:

If a law could be passed authorizing the President to raise volunteers for twelve months, it would be of the greatest importance for a service so remote from support as this.^b

The promptitude with which Congress entertained and complied with the President's unfortunate recommendation finds no parallel in

^aHouse Ex. Doc. No. 196, Twenty-ninth Congress, first session, p. 6.

^bHouse Ex. Doc. No. 60, Thirtieth Congress, first session, p. 141.

our history.^a The very day his message was received a bill to raise 50,000 volunteers was introduced, and under the operation of the previous question passed the House of Representatives. The next day it passed the Senate, and on the 13th received the President's signature.

The first section of the act read as follows:

Whereas, by the act of the Republic of Mexico, a state of war exists between that Government and the United States, that, for the purpose of enabling the Government of the United States to prosecute said war to a speedy and successful termination, the President be, and he is hereby, authorized to employ the militia, naval, and military forces of the United States, and to call for and accept the services of any number of volunteers, not exceeding 50,000, who may offer their services, either as cavalry, artillery, infantry, or riflemen, to serve twelve months after they shall have arrived at the place of rendezvous, or to the end of the war, unless sooner discharged, according to the time for which they shall have been mustered into service; and that the sum of \$10,000,000, out of any moneys in the Treasury, or to come into the Treasury, not otherwise appropriated, be, and the same is hereby, appropriated for the purpose of carrying the provisions of this act into effect.^b

The second section extended the term of the militia, when called into the service of the United States, to six months; the third section required the volunteers to furnish their own clothes, horses, and equipments, the arms to be furnished by the United States; the fourth section gave to each volunteer, as compensation for his clothing, the cost of clothing allowed to a regular soldier; the fifth section, ignoring the fact that the new force was not militia, authorized the officers to be appointed according to the laws of their several States; the ninth section gave the volunteers the same pay and allowances as regular soldiers, and allowed to those who were mounted a compensation for their horses of 40 cents per day.

It ought not to surprise us if a law passed without debate should have contained many costly, if not dangerous, mistakes. The principal one of these was contained in the brief words "to serve twelve months" or "to the end of the war." Whether this unfortunate alternative may be regarded as evidence of the conviction on the part of Congress that a foreign war could be brought to a speedy and successful end in twelve months—a thing that has never occurred, and probably never will occur under our present system—or as an expression of its confidence in the wisdom and judgment of the President, it is not necessary to discuss.

As might have been foreseen, the sequel proved that our best and only safeguard lies in wise legislation. The provisions of the law, more liberal than those recommended by the President, authorized him, at his option, to accept the services of volunteers "for twelve months" or "for the war." Instead of deciding upon the volunteers for the war, the President permitted the circular calling for the new troops to be couched in the exact wording of the law, thereby enabling each volunteer, at the expiration of twelve months, to elect whether he would receive his discharge or remain in service till the end of the war.

^a Under the joint resolution of Congress of April 20, 1898, and the Act of Congress, dated April 22, 1898, President McKinley issued a call for 125,000 volunteers for the Spanish war on April 23. On May 31, a little more than a month after the President's proclamation, nearly all of this immense force of volunteers had been mustered into the United States service. Under the call of the President of May 25, 75,000 additional volunteers were called for. The last volunteers under these two calls, were mustered in, August 24, 1898.—EDITORS.

^b Callan's Military Laws of the United States, first section, p. 367,

The dilemma in which the Government thus placed itself by mere want of foresight was foreshadowed in the annual report of the Secretary of War of December 5, 1846. After stating that the volunteers in their encounters with the enemy had "more than justified the expectations formed of that description of troops," but "that it was no disparagement to them to say that a regular force was to be preferred in a war to be prosecuted in a foreign country," he added:

Those who are now in the field, with the exception of one regiment sent out to California, entered the service under the alternative of continuing in it for twelve months or to the end of the war; and it is presumed they will have the right—at all events they will have the permission if they claim the right—to retire from the service at the end of that period, which will expire about the (end) 1st of June next.^a

The needless expense caused by this great mistake may be inferred from the fact that on the 13th of May, the day the law received the President's signature, requisitions were made upon the governors of the States of Arkansas, Mississippi, Alabama, Georgia, Tennessee, Kentucky, Missouri, Illinois, Indiana, and Ohio—

for a volunteer force equal to 26 regiments, amounting in all, with a battalion from the District and Maryland, to about 23,000 effective men, to serve for the period of twelve months or to the end of the war.^b

* * * * *

Nine regiments and one battalion of volunteers have been recently called for from various States to serve to the end of the war, and the information received at the Department gives the assurance that these requisitions will be promptly and cheerfully complied with.^c

The above showed the effort made to retrieve the error already committed and proved that the requirement of service "for the war" would in no wise have lessened the spirit of volunteering.

Although not so dangerous to the success of our arms as the error just referred to, there was another defect in the law which diminished our strength and at the same time exposed the new levies to needless suffering and privation. Under the construction of the fourth section of the act, it was decided that the volunteers first called out should receive, on being mustered into service, the cost of a year's clothing, amounting to \$42. The effect was thus explained by the Secretary in his report:

This sum was not always appropriated for clothing, and many of them soon became so destitute as to suffer in their health, and in other respects to be scarcely fit for service. To this cause, in no inconsiderable degree, is to be ascribed the great disparity of sickness between volunteers and regular troops, the latter being well clothed by the Government and comparatively much more healthy.^d

The military legislation on the 13th of May was not limited to raising a force of volunteers. Another act of the same date authorized the President, by voluntary enlistment, to increase the number of privates in each or any of the companies of the dragoons, artillery, and infantry to not exceeding 100, the number to be reduced to 64 when the exigency requiring the increase should cease.

It will thus be seen that while during peace all discretion to increase the Army was withheld from the President through motives of economy, or of jealousy of the Army, the moment war was declared the power of expanding it was freely committed to his trust, a power that enabled him, without adding an officer to the line, to raise the enlisted strength from 7,580 to 15,540.

^a House Ex. Doc. No. 4, Twenty-ninth Congress, second session, p. 54.

^b Report of Secretary of War. House Ex. Doc. No. 4, Twenty-ninth Congress, second session, p. 47.

^c Same, p. 54.

^d House Ex. Doc. No. 4, Twenty-ninth Congress, second session, p. 56.

Had this discretion been granted to the President by the law of 1842, the army of occupation need not have been exposed to an attack by an army of three times its numbers; neither would there have been any occasion to expose to the ravages of disease the thousands of three months' men who rushed to its rescue.

On the 19th of May a regiment of mounted riflemen intended for service in Oregon was added to the Army. The remaining laws, from May 13 to the month of August, the end of the first session of the Twenty-ninth Congress, mainly related to the temporary increase during the war, of the various staff departments.

The Army, as organized by the foregoing laws, numbered 775 officers and 17,020 men; total, 17,812;^a but so slow was the recruitment that, by the return of December 5, 1846, the aggregate present and absent numbered 10,690,^b leaving a deficiency of recruits amounting to 6,958.

The reasons for this deficiency, the same as existed during the Revolution and the War of 1812, were plainly set forth in the Secretary's report.

The want of better success in recruiting is, I apprehend, mainly to be ascribed to the large number of volunteers which has, in the meantime, been called out. The volunteer service is regarded generally by our citizens as preferable to that in the Regular Army, and as long as volunteers are expected to be called for it will be difficult to fill the ranks of the regular regiments unless additional inducements are offered or the terms of service modified. A small pecuniary bounty given at the time of enlistment, or land at the end of the term of service, would, it is believed, have a most beneficial effect. Probably an equally favorable result would flow from annexing a condition to the present period of service, allowing the recruit to be discharged at the end of the present war. It is presumed there are many thousand patriotic citizens who would cheerfully enter the service for the war if they could return to the pursuits of civil life at its close.^c

The second section of the law for the increase of the staff departments merits attention. It authorized the President—

to call into the service, under the act approved May 13, 1846, such of the general officers of the militia as the service, in his opinion, may require, and to organize into brigades and divisions the forces authorized by said act, according to his direction.^d

This section would apparently denote that Congress regarded the volunteers under the Constitution as substantially the same as the militia, and that conformably with the law of 1792 the Governors of States had an equitable right to the appointment of all the officers, from the highest to the lowest grades. This partial adhesion to the State system was the means, in many instances, of placing the fortunes of the country, as well as the lives of our soldiers, in the hands of generals utterly ignorant of the military art at a time when the Government had at its disposal numbers of competent officers who had devoted their lives to the theory and practice of their profession.

The first law of the next session was passed on the 12th of January, 1847, and, pursuant to the recommendation of the Secretary of War, permitted recruits to enlist in the Regular Army for the period of "five years" or "during the war." The recruits were also to receive a bounty of \$12, \$6 paid in hand, the remainder to be retained till the recruit joined the regiment. Had patriotic citizens been permitted to enlist in the Regular Army for the war at the outset, it is probable that the difficulties of recruitment might have been largely diminished.

^a Army Register, 1847.

^b House Ex. Doc. No. 4, Twenty-ninth Congress, second session, p. 68.

^c House Ex. Doc. No. 4, Twenty-ninth Congress, second session, p. 53.

^d Callan's Military Laws of the United States, first section, p. 373.

The legislation of the new session was not limited to the recruitment of the Army. On the 11th of February, but not till more than two months after the commencement of the session, Congress passed an act increasing the Army by 1 regiment of dragoons and 9 of infantry, the regiments to serve, and the men to be enlisted, for the war. One of these infantry regiments was to be organized and equipped as voltigeurs and foot riflemen, and to be provided with a rocket and mountain howitzer battery.^a

The second section of the law, recognizing, in the absence of the law of retirement, the great scarcity of field officers with the troops, authorized the appointment of an additional major to each of the regiments of dragoons, artillery, infantry, and riflemen, the majors to be selected from the captains of the Army.

The necessity for a law of retirement, which was strongly urged during the Florida war, was again presented at the beginning of the Mexican war. On the 30th of July, 1846, the Adjutant-General reported that out of 12 field officers of artillery but 4 were able to take the field, the remainder being disqualified by reason of age, wounds, or other disabilities. In the infantry one-third of the 24 field officers were disqualified to take the field for the same reasons. In the 5 regiments of infantry, belonging to the army of occupation, there were present but 6 field officers, 2 of whom, General Taylor and General Worth, held commands higher than a regiment.^b

The ninth section gave to every soldier, whether volunteer or regular, who had enlisted for twelve months, a bounty, on receiving an honorable discharge, of 160 acres of land, or the equivalent of \$100 in Treasury scrip bearing interest at 6 per cent. Soldiers of less than a year's service were in like manner given a bounty of 40 acres of land or \$25 in scrip. Other sections of this law provided for an increase of the Pay and Quartermaster's Departments, necessitated by the general increase of the line. The delay in the passage of the above law, which was recommended in the President's message at the beginning of the session, made it impossible for the new regiments to arrive in the field till late in the summer.

March 3, 1847, another act was passed, authorizing an increase of the general officers to correspond to the number of new regiments which were to be discharged at the end of the war. The second section added a lieutenant-colonel and two captains to the Adjutant-General's Department.

The third section, passed on the President's recommendation as a means of partially retrieving the mistake of short enlistments, authorized him to organize into companies, battalions, and regiments such volunteers then in Mexico as would reenlist for the war. The section also contained the important recognition of the right of the President to commission the officers of volunteers.

The fourth section gave to the volunteers so reenlisting a bounty of \$12. The fifth section authorized the President to accept the services of individual volunteers to fill vacancies in any of the existing regiments of volunteers. These three sections clearly indicated a growing difficulty in procuring volunteers to replace casualties, a difficulty that would have increased in accordance with all previous experience in direct proportion to the prolongation of the war.

^a Callan's Military Laws of the United States, first section, p. 379.

^b House Ex. Doc. No. 4, Twenty-ninth Congress, second session, pp. 72, 73.

The twelfth, thirteenth, and fourteenth sections increased the Pay Department; the sixteenth section added 2 captains and 6 first lieutenants to the Ordnance Department; the eighteenth section added 2 companies to each regiment of artillery, and authorized 2 light batteries to be equipped in each regiment; the twenty-first section, recognizing the difficulty of recruiting by voluntary enlistment, authorized the President, in case of failure in filling any regiment or regiments (regulars or volunteers), to consolidate such deficient regiment or regiments, and discharge all supernumerary officers. This law, passed the day before the close of the second session of the Twenty-ninth Congress, completed all the military legislation of the war.

As organized under the foregoing laws, the Army was composed as follows:^a

	Officers.	Men.	Total.
General staff *.....	86	.....	86
Medical department	85	.....	85
Pay department.....	81	.....	81
Military storekeepers	17	.....	17
Corps of engineers	48	100	148
Corps of topographical engineers	36	.....	36
Ordnance department	36	620	656
Three regiments of dragoons.....	118	3,408	3,526
One regiment mounted riflemen.....	35	1,146	1,181
Four regiments of artillery	208	5,492	5,700
Sixteen regiments of infantry	648	17,664	18,312
One regiment of infantry	47	1,104	1,151
Aggregate	1,356	29,584	30,940

* Eleven assistant adjutants-general and 23 assistant quartermasters of the general staff, being detailed from the line and counted in their regiments, are, to avoid being counted twice, deducted from the number 86 in summing up the total officers and aggregate of officers and men.

The field officers of each of the line regiments consisted of 1 colonel, 1 lieutenant-colonel, and 2 majors.

The strength of each company and regiment in the different arms was as follows:

	Officers.	Men.	Total.
First and second dragoons (old army):			
Company	3	113	116
Regiment (10 companies)	35	1,136	1,171
Third dragoons (new army):			
Company (1 captain, 1 first lieutenant, 2 second lieutenants)	4	113	117
Regiment (10 companies)	43	1,136	1,184
Mounted riflemen:			
Company	3	114	117
Regiment (10 companies)	35	1,146	1,181
Artillery:			
Company (1 captain, 2 first lieutenants, 1 second lieutenant)	4	114	118
Regiment (12 companies)	52	1,378	1,425
Infantry (old army):			
Company	3	110	113
Regiment (10 companies)	34	1,104	1,138
Infantry and voltigeurs (new army):			
Company (1 captain, 1 first lieutenant, 2 second lieutenants)	4	110	114
Regiment (10 companies)	47	1,104	1,151

The adjutants in the regiments of dragoons and riflemen were extra lieutenants. The adjutants of artillery, infantry, and voltigeurs, as

^a Army Register, 1848.

also the regimental quartermasters in all arms of the service, were lieutenants detailed from the subalterns. This provision in time of war proved to be false economy. It necessarily reduced two companies in each infantry regiment to two officers each at the beginning of a campaign, and when casualties occurred, exposed it to the danger of being left without a commissioned officer.

Having examined all military legislation since the announcement of hostilities, we may now return to the operations of the army on the Rio Grande.

CAMPAIGNS OF MONTEREY AND BUENA VISTA.

So rapid was the organization of volunteers under the President's call of May 13, 1846, that some of the new regiments arrived on the Rio Grande during the month of June, and such numbers soon followed that the commander was at a loss as to their employment and subsistence. In fact, when he proceeded in August up the Rio Grande to Camargo, and thence began his march to Monterey, with an army composed of two divisions of regulars and a field division of volunteers—his entire force but little more than 6,000—he was compelled to leave no less than 6,000 volunteers behind. His reasons for this were given in Order No. 108, issued at Camargo on August 28, 1846:

The limited means of transportation, and the uncertainty in regard to the supplies that may be drawn from the theater of operations, imposes upon the commanding general the necessity of taking into the field, in the first instance, only a moderate portion of the volunteer force under his orders.^a

It further appears that "while some 20,000 volunteers were sent to the theater of war, not a wagon reached the advance of General Taylor till after the capture of Monterey."^b

This lack of transportation developed in a striking manner the want in our War Department of a bureau of military statistics. General Jesup, the Quartermaster-General, wrote to the Secretary of War from New Orleans, on the 15th of December, 1845:

As to the complaint in regard to the want of land transportation, it is proper to remark that there was no information at Washington, so far as I was informed, to enable me or the War Department to determine whether wagons could be used in Mexico.^c

This deficiency of wagons, however, in the end proved to our advantage, since it enabled the commander to form the volunteers who were left behind, into an army of the second line and to drill and prepare them for future campaigns. The importance which General Taylor attached to instruction was referred to by a writer who, after describing the causes of our success at Palo Alto and Resaca de la Palma, stated:

Never was the value of disciplined men more triumphantly demonstrated than on these glorious occasions; and since we have learned that General Taylor compels the volunteers with him to receive six hours' drilling per day and relieves them from all other duties, to make soldiers of them, we venture to predict that they, too, when they meet the enemy, will add to the reputation of our arms. "Rough and Ready" will first make them soldiers and then win victories with them.

This prophecy was not slow of fulfillment. In the battle around Monterey, from the 20th to the 23d of September, the volunteers fought

^a House Ex. Doc. No. 119, Twenty-ninth Congress, second session, p. 210.

^b Stevens's Campaigns of the Rio Grande and of Mexico, p. 21.

^c Montgomery's Life of General Taylor, p. 169.

with a steadiness that earned the applause of their comrades of the regulars.

The forces engaged at Monterey numbered,—Mexicans, 10,000, of whom 7,000 were regulars; Americans, regulars and volunteers, 6,645.^a The losses in these battles, which resulted in the capitulation of the city—the Mexican garrison being permitted to retire with their arms—were:

Regulars, killed and wounded ^b	205
Volunteers ^c	282

But a still greater triumph awaited the volunteers. In January, 1847, nearly all the regular troops, as also a large number of volunteers, were withdrawn to take part under General Scott in the campaign against the City of Mexico.

This detachment, which it was expected would confine General Taylor to the defensive, at least till after the arrival of new regiments of volunteers called out for the war, reduced the force with which in December he had advanced beyond Saltillo to about 6,000 men. Availing himself, with the instincts of a skillful commander, of this division of our forces, General Santa Ana advanced to Buena Vista, where, on the 22d and 23d of February, he sought to overwhelm and capture our army. In this battle, the most desperate of the war, our forces, numbering 4,759 men, of whom but 517 were regulars, defeated the entire Mexican army, estimated at 20,000.^d Our losses were 746 killed, wounded, and missing.^e The Mexican loss was estimated at 1,500.^f In his official report General Taylor gave the regular artillery, composed of the celebrated batteries of Washington, Sherman, and Bragg, the credit of saving the day. But the battle of Buena Vista, like all great battles, was fought chiefly by infantry, and the gallant volunteers, who, against overwhelming numbers, successfully maintained the honor of our arms, had been undergoing field training for nearly eight months, a period twice as long as the time considered necessary to transform a recruit into a regular soldier.

In referring to General Wool, General Taylor in his official report stated:

The high state of discipline and instruction of several of the volunteer regiments was attained under his command, and to his vigilance and arduous service before the action and his gallantry and activity on the field a large share of our success may justly be attributed.^g

General Taylor and General Wool were not alone in their efforts to discipline and instruct the Army. The commander of the Mississippi Rifles, as also the field officers of the Second Kentucky Volunteers, of which the colonel and lieutenant-colonel laid down their lives, were former officers of the Army.

^a Ripley's War with Mexico, vol. 1, p. 198, 199.

^b House Ex. Doc. No. 24, Thirty-first Congress, first session, p. 10, Table B.

^c Same, p. 28, Table D.

^d General Taylor's official report, Ex. Doc. No. 1, Twenty-ninth Congress, first session. In his official report of the battle, Santa Ana states that he left San Luis Potosi with 18,133 men, and that his artillery train consisted of 17 pieces. General orders found on the battlefield indicate that he had 20 pieces of artillery. In summoning General Taylor to surrender, the Mexican commander gave his strength at 20,000 men.—
Editors.

^e House Ex. Doc., No. 24, House of Representatives, Thirty-first Congress, first session, p. 13 B and 29 D.

^f General Taylor's official report, Montgomery's Life of General Taylor, p. 299.

^g Montgomery's Life of General Taylor, p. 298, 299.

In addition to this preparation, when the critical moment arrived, the courage of the men was everywhere stimulated by the example and conduct of the artillery. Without waiting for support it moved rapidly from position to position, over the roughest ground, "its well-directed fire" dealing destruction "in the masses of the enemy." "Always in action at the right place and the right time,"^a it served as rallying points for the broken and hard-pressed infantry, which but for its presence must have been driven in confusion from the field.

In this one fact—the ability of the infantry to rally—when in some regiments nearly all of the field officers were killed or disabled, we have the crowning proof that the volunteers at Buena Vista were no longer raw troops. They gave evidence to the true statesman, that in rescuing victory from defeat, their discipline, no less than their patriotism had made them worthy to receive the applause of a grateful country. The battle of Buena Vista, begun on the anniversary of Washington's birthday, terminated the brilliant exploits of the army of occupation.

CAMPAIGN OF THE CITY OF MEXICO.

Up to the capitulation of Monterey it was hoped that by occupying the northern provinces, Mexico would accept propositions of peace; but when subsequent events proved this idea to be fallacious, it was decided to carry the war to her capital through the gateway of Vera Cruz. Accordingly, in November, 1846, General Scott sailed for Brazos (Point Isabel), where he collected and organized an army, which, like General Taylor, he was to lead from victory to victory.

Before proceeding to the field, he submitted on the 27th of October, a memorandum to the Secretary of War, in which he estimated the minimum force required to capture Vera Cruz at 10,000 men; this number, with a view to ulterior operations, to be increased by the month of March to 20,000; the reinforcements to be composed of volunteers and the new regiments of regulars expected to be raised by the next Congress.

On the 23d of November, before leaving Washington, he expressed

^a In reporting the battle, General Taylor said: In the meantime the firing had ceased upon the principal field. The enemy seemed to confine his efforts to the protection of his artillery, and I had left the plateau for a moment, when I was called thither by a very heavy musketry fire. On regaining that position I discovered that our infantry (Illinois and Second Kentucky), had engaged a greatly superior force of the enemy—evidently his reserves—and that they had been overwhelmed by numbers. The moment was most critical. Captain O'Brien, with two pieces, had sustained his heavy charge to the very last, and was finally obliged to leave his guns on the field—his infantry support being entirely routed. Captain Bragg, who had just arrived from the left, was ordered at once into battery. Without any infantry to support him, and at the imminent risk of losing his guns, this officer came rapidly into action, the Mexican line being but a few yards from the muzzle of his pieces. The first discharge of canister caused the enemy to hesitate; the second and third drove him back in disorder and saved the day. The Second Kentucky Regiment, which had advanced beyond supporting distance in this affair, was driven back and closely pressed by the enemy's cavalry. Taking a ravine which led in the direction of Captain Washington's cavalry, their pursuers became exposed to his fire, which soon checked and drove them back with loss. In the meantime the rest of our artillery had taken position on the plateau, covered by the Mississippi and Third Indiana Regiments, the former of which had reached the ground in time to pour a fire into the right flank of the enemy, and thus contribute to his pulse. In this last conflict we had the misfortune to sustain a very heavy loss. Colonel Hardin, First Illinois, and Colonel McKee and Lieutenant-Colonel Clay, Second Kentucky Regiments, fell at this time while gallantly heading their commands.

to the Secretary of War a willingness to proceed with the expedition, if necessary, with 8,000 men. From Brazos, January 12, he wrote to the Secretary of War:

Should success crown our arms on the coast—and I will not anticipate a failure—I beg to repeat that a reenforcement of 10,000 or 12,000 regulars (new regiments and recruits for the old) will be indispensable (about April), to enable me to make a consecutive advance on the enemy's capital.^a

The necessary troops, regulars and volunteers, having been collected and embarked at Brazos, General Scott sailed for Vera Cruz, where he arrived on the 7th of March, disembarked on the 9th, invested the city on the 10th, and on the 29th received its surrender. After the surrender the organization of our army, before moving on the enemy's capital, was as follows:^b

First Regular Division, Bvt. Maj. Gen. William J. Worth, commanding: Light Company A, Second Artillery; Second Artillery, 8 companies; Third Artillery, 4 companies; Fourth Infantry, 6 companies; Fifth Infantry, 6 companies; Sixth Infantry, 5 companies; Eighth Infantry, 7 companies.

Second Regular Division, Brig. Gen. David E. Twiggs, commanding: Light Company K, First Artillery; howitzer and rocket company; regiment mounted rifles, 9 companies; First Artillery; Fourth Artillery, 6 companies; Second Infantry, 9 companies; Third Infantry, 6 companies; Seventh Infantry, 6 companies.

Volunteer division, Major-General Patterson commanding: Third Illinois; Fourth Illinois; New York regiment, 10 companies; First Tennessee; Second Tennessee; Kentucky regiment; First Pennsylvania, 10 companies; Second Pennsylvania, 10 companies; South Carolina regiment, 11 companies; detachment of mounted Tennessee Volunteers.

Not assigned to divisions: One company of engineers; 1 company of ordnance; 6 companies of cavalry.

The strength of the army, composed of 21 different regiments or parts of regiments, was less than 12,000 men.^c

Having established his base of operations and completed the organization of his troops, General Scott on the 8th of April began his march into the interior, and on the 18th, at Cerro Gordo, attacked and overthrew the entire Mexican army, capturing seven standards, 3,000 prisoners, and 43 pieces of artillery. So complete was the defeat that, in the language of the general in chief, "Mexico had no longer an army." The road to the capital now lay open before him, but when he sought to advance a defect of legislation put an end to his conquests. The policy of short enlistments, which in so many wars had caused our troops at critical moments to abandon their commanders, was to find its logical conclusion in the dissolution of our army in the heart of an enemy's country.

This result, as might have been foreseen, was due to the option given to the volunteers "to serve twelve months" or "to the end of the war," a result that might have been prevented had any member of Congress familiar with the history of his country sought to strike out the first part of the fatal alternative, or to substitute for it the term of three years. Wisdom, prudence, economy, humanity, and every consideration within the pale of statesmanship, demanded the creation of an army enlisted for the war, and as the popular enthusiasm would have responded to such a call with the same alacrity as for twelve months, the defect in the law can only be ascribed to the haste, if not thoughtlessness, which has so often characterized our military legislation.

^a Stevens' Campaigns of the Rio Grande and of Mexico, p. 48.

^b Memorandum furnished by Adjutant-General.

^c Scott's Autobiography, vol. 2, p. 420.

Fearing exposure to the yellow fever, and beginning to look forward to their discharge six weeks before the expiration of their term of enlistment, General Scott, on the 4th of May, parted with seven of his eleven regiments of volunteers, numbering in the aggregate 4,000 men. Thus reduced by discharge, by expiration of service, and by disease to 5,820^a effective men, our army, which had advanced to Puebla, within three days' march of the enemy's capital, was compelled for more than two months to remain on the defensive, while the enemy, profiting by the delay, reorganized an army of five times its number. In fact, after the discharge of the volunteers, having heard of no reinforcements, except 960 recruits ordered from New York and Newport, Kentucky, General Scott abandoned Jalapa, and with no communication with his base of supplies he found himself needlessly exposed to the danger of investment and capture. Formidable as had been our preparations, they appeared about to collapse, a calamity that was only averted by the superior quality of our troops.

Had the small force of General Scott, embracing nine-tenths of the Regular Army, been captured, experience teaches us that with the system of short enlistments and inexperienced officers, 100,000 raw troops could not have retrieved the disaster. Our failure to appreciate the demands of a foreign war was again proven at this period of our history. The recommendations for a number of new regular regiments, it will be remembered, were not adopted till the 11th of February, 1847, which so delayed their organization that they arrived only in time to participate in the brief operations about the City of Mexico.

The appointment of the officers of these regiments reveals another inconsistency in our military policy. From its foundation the Military Academy had been assailed by enemies who demanded its abolition; but Congress had wisely resisted this clamor, and, refusing to yield to a memorial from the legislature of a State which to-day among its West Point graduates boasts of a Grant, a Sherman, and a Sheridan, had steadily voted appropriations, until at the outbreak of the Mexican war nearly every regular officer below the rank of major had received the benefit of its instruction. Educated at no inconsiderable cost, had these officers been appointed colonels and captains of the new regiments, in a couple of months the latter would have begun to acquire the steadiness of veterans, and in battle would have made a handsome return to the nation for the expense incurred in training its officers.

But a policy so wise was prevented by a defect or an omission, in the law, which was explained by the Secretary as follows:

There is so much doubt whether officers now in the Regular Army would take commissions of not more than one or two grades above those which they now hold, that it is not probable many will be selected for the new regiments. As these regiments are to be disbanded by express provision of the law which authorizes them, at the conclusion of the war, those officers who may be transferred to them would be in great danger of being thrown out of the Army.^b

Had the law, with the object of using professional training to the greatest advantage, prescribed that even the field officers of the new regiments should be selected, as in the case of the additional majors, from the officers of the Army, with the further provision that they should not vacate their commissions, the new troops could soon have been made efficient. In the absence of such a provision, the Army

^aHouse Ex. Doc. No. 60, Thirtieth Congress, first session, p. 993.

^bHouse Ex. Document No. 60, Thirtieth Congress, first session, p. 873.

Register shows that, with the exception of six officers who were, or had been, in the Regular Army, the officers of the new regiments, numbering more than 400, were appointed fresh from civil life.^a

As a consequence of this policy inexperienced colonels and ignorant captains led the new regiments to battle, while in the old battalions the future commanders of our armies were trudging as file closers in rear of their companies. Such a policy, bad enough for the infantry, when applied to the dragoons, an arm of service requiring for its efficiency years of training, could only result in a waste of the public treasure. At the same time that the new regiments were organizing, the Government as late as April, 1847, continued to accept fresh volunteers, all, it is needless to say, enlisted "for the war."

These new troops, both regulars and volunteers, as fast as organized were forwarded to the little army which for three months had remained at Puebla, overlooking an enemy's capital numbering more than 180,000 people. The slowness with which reinforcements were forwarded to Mexico shows how impossible it would have been to afford succor to our army had the enemy been able to take the offensive.

On the 4th of June a small detachment of 3 companies of dragoons and 6 of infantry, composed almost wholly of recruits, left Vera Cruz with a large train, but being attacked by guerrillas the second day out they were compelled to halt for reinforcements. June 8 General Cadwalader, with another detachment of 500 men, marched to the support of Colonel McIntosh, joined him on the 10th, and together after a sharp skirmish pushed on to Jalapa, where they arrived on the 15th. The 19th, having been joined by the garrison of Jalapa, General Cadwalader again resumed the march, arriving on the 21st at Perote. Here part of his animals having given out, he had to wait till the 23d to refit, when, as he was about to march, he received orders from General Pillow, who had arrived at Vera Cruz on the 13th, to delay till their forces could unite. This being accomplished on the 1st of July, the combined force of 4,500 men resumed the march on the 2d and 3d, and on the 8th joined the army at Puebla. The arrival of the puny reinforcement more than two months and a half after the battle of Cerro Gordo raised the total strength of the army to but 10,276, of whom 2,215, or nearly one-fourth, were sick.^b

On the 19th of July another reinforcement of 3,000 men, composed chiefly of the new regular regiments and recruits for the old army, left Vera Cruz under General Pierce, and, reduced to 2,429 men,^c reached Puebla on the 6th of August. Reinforced in the aggregate to nearly 14,000 men, of whom 3,000 were sick or in hospital, while other detachments were made to guard this line of communications, General Scott, on the 7th of August, resumed the offensive against an army estimated by the Mexicans themselves at 36,000 men and 100 pieces of cannon.^d The composition of his army at the moment of advancing in the face of such overwhelming numbers was as follows:

^a The act of Congress of March 2, 1899, authorized the President to raise a force of not exceeding 35,000 volunteers. It has been said of these regiments that the Government has never had more satisfactory volunteers, and this has been largely attributed to their method of organization, and to the fact that the senior officers in each of the regiments were selected on their efficiency records from the officers of the Regular Army.—EDITHS.

^b House Ex. Doc. No. 60, Thirtieth Congress, First session, p. 1013.

^c Ripley's War with Mexico, vol. 2, p. 166.

^d Ripley's War with Mexico, vol. 2, p. 161.

Gen. William J. Worth's division.

Bvt. Col. John Garland's brigade: Second Artillery, Third Artillery, Fourth Infantry.

Col. N. S. Clarke's brigade: Third Infantry, Sixth Infantry, Eighth Infantry, Light Company A, Second Artillery; Light battalion.

Gen. David E. Twiggs's division.

Gen. P. F. Smith's brigade: First Artillery; Third Infantry; Rifle Regiment.

Col. B. Riley's brigade: Fourth Artillery; Second Infantry; Seventh Infantry; Engineer company; Ordnance company; Light Company K, First Artillery.

Gen. Gideon J. Pillow's division.

Gen. F. Pierce's brigade: Ninth Infantry; Twelfth Infantry; Fifteenth Infantry.

Gen. George Cadwalader's brigade: Voltigeurs; Fourteenth Infantry; Eleventh Infantry; Light Company I, First Artillery.

Gen. J. A. Quitman's division.

Gen. James Shields's brigade: New York Regiment; South Carolina Regiment; Marine Corps.

Lieut. Col. S. E. Watson's brigade: Second Pennsylvania Volunteers; H Company, Third Artillery; C Company, Third Dragoons.

Gen. Wm. S. Harney's brigade: First Battalion Cavalry; Second Battalion Cavalry.

The relative composition of the army of regulars and volunteers should not escape the reader's attention. The President in his message asked Congress to give him "a large body of volunteers to serve not less than six or twelve months." Congress, going beyond the request, gave him authority to call out 50,000 for "twelve months," or "to the end of the war," and yet, through his own mistake, when the crisis arrived there were but four half-filled regiments present to participate in the conflict.

But those regiments organized in December of 1846 had had the benefit of eight months' training, had already participated in the siege of Vera Cruz and the battle of Cerro Gordo, and were worthy of being called reliable troops. Advancing with an army of less than 10,000 effectives, the brilliant victories of Contreras, Cherubusco, El Molino del Rey, and Chapultepec opened the gates of the capital, which General Scott entered on the 14th of September. In the series of battles, beginning on the 20th of August, our largest force engaged was 8,479; our loss in killed and wounded was 2,703, which reduced the army when it reached the city to less than 6,000 men.

The aggregate strength of the three regiments of volunteers which participated in these battles—the fourth being left to garrison Puebla—was on the morning of the battle of Contreras 1,580. The aggregate strength of the Army, regulars and volunteers, on the same date was 11,052.^a The forwarding of troops after the crisis had passed was not unlike that which followed the battle of Palo Alto.

On the 19th of July the Secretary of War wrote to General Scott that since the 24th of May he had heard of the arrival at Vera Cruz "of 4,603 regular troops (new levies and reorganized companies), 300 marines, and two companies of Pennsylvania volunteers 133 strong," making an aggregate of over 5,000 men.^b

^a Official report of General Scott, dated National Palace, Mexico, September 18, 1847.—A. G. O.

^b House Ex. Doc. No. 60, Thirtieth Congress, first session, p. 1003.

On the 6th of October he again wrote:

There is also a considerable volunteer force which was called out many months since, and has been slow in organizing, now on its way to your column. The Adjutant-General's estimate herewith of the total number of these troops and other detachments make the aggregate force en route under orders and being mustered into service about 15,000, since General Pierce's advance from Vera Cruz on the 14th of July.^a

Notwithstanding these numbers it was not until October 18,^b that General Lane with 3,300 reached Puebla. November 10, General Patterson with 2,600^c arrived at Jalapa; December 14, these combined reinforcements, advancing in two or three columns, concentrated at Puebla to the number of 9,000;^d December 17, their advance reached the City of Mexico. In the meantime such was the sickness of the troops in the army at the capital that those present for duty on December 4, were reported by General Scott as only about 6,000.^e These figures show that in consequence of errors of statesmanship and a bad system of recruitment we needlessly exposed our army to the dangers of capture for a period of more than six months. Had the strength of the army during this time been calculated with nicety, based on a knowledge of the numbers and discipline of the enemy, we might applaud the apparent economy which achieved such results; but with the fact already stated, that for want of a bureau of military statistics, the chief of the most important department of supply could not learn at Washington whether wagons could be used in Mexico, we must ascribe the perils of our troops to the same mismanagement and want of reflection that supplied the means for military operations in 1812.

Notwithstanding the delays in forwarding men and supplies, such was the quality of our troops that the enemy, no longer able to oppose them, listened to propositions of peace, and on the 2d of February, 1848, ratified the treaty of Guadalupe-Hidalgo. Pursuant to this treaty and the President's proclamation, our army on the 5th of the following July, 26 months after the commencement of hostilities, evacuated Mexican territory.

STATISTICS.

With the salient facts before us, that General Taylor fought the first battles of the war with 2,100 regulars, when, but for the defect of the law, he might have had, by a simple increase of the rank and file, a force of 8,000; that the 13 regiments of the Regular Army with which General Scott landed at Vera Cruz could have been raised to 15,000 men; that with such an army he could have entered the City of Mexico on the heels of Cerro Gordo; that at no time before the event his maximum force exceeded 13,500,^f and that after a brilliant series of battles he finally entered the Mexican capital with less than 6,000 men, let us next consider the number of troops the Government employed:

Regulars (old establishment).

Army of occupation, May, 1846.....	3,554
Number of recruits and troops who joined the Army in Mexico.....	15,736
Total.....	19,290

^a House Ex. Doc. No. 60, Thirtieth Congress, first session, p. 1008.

^b Same, p. 1030.

^c Same, p. 1031.

^d Same, p. 1039.

^e Same, p. 1033.

^f Scott's Autobiography, vol. 2, p. 420.

Regulars (new establishment).

1 regiment of dragoons, 8 regiments of infantry, 1 regiment of voltigeurs.....	11, 188
Total, Regular Army.....	30, 476
Battalion of marines.....	548
Total, regular forces.....	31, 024

Reenforcements for the old army to the number of 19,066 started for Mexico, leaving, after deducting 15,736 who joined, 3,930 who never reached their destination. The whole number of troops and recruits sent to the new establishment was 11,976, of whom 790 failed to join. For the old establishment from May 1, 1846, to July 5, 1848, 21,018 men were enlisted. For the new establishment during the same period the number was 13,991. Total 35,009.

Volunteers.

General staff.....	272
Mustered for three months (militia).....	1, 390
Mustered for six months, but held only for three.....	11, 211
Mustered for twelve months.....	27, 063
Mustered for the war.....	33, 596
Total.....	73, 260
Total staff and volunteers.....	73, 532

Resolving the volunteer force of 73,260 into the different arms of service, it consisted of—

Cavalry or mounted troops.....	16, 887
Artillery.....	1, 129
Infantry.....	55, 244

Resolving it into officers and men, it consisted of—

Officers.....	3, 131
Noncommissioned officers and privates.....	70, 129

In this mass of men, who were totally inexperienced at the beginning of their service, there was a leaven of between thirty and forty officers who were in, or had been in, the Regular Army. The total force employed during the war, including 31,024 regulars and marines, was 104,284.

The actual number mustered in, exclusive of the army of occupation (3,554) and 548 marines, was 100,454.

From these figures it will be perceived that the regular troops, 31,024, exceeded more than six times the number of regulars and volunteers with whom Taylor at Buena Vista defeated the entire Mexican army; while, omitting the three and six months' men and adding 31,024 to the 60,659 volunteers for twelve months and the war, the aggregate, 91,683 regulars and volunteers, was nine times as great as the effective strength of the army with which Scott fought the decisive battles around the City of Mexico.

CASUALTIES.

The casualties among the different classes of troops were as follows:

OLD ESTABLISHMENT (19,290).

Discharged:		
Expiration of service	1,561	
Disability	1,782	
By order and civil authority	373	
		3,716
Killed in battle:		
Officers	41	
Men	422	
		463
Died of wounds:		
Officers	22	
Men	307	
		329
Wounded:		
Officers	118	
Men	1,685	
		1,803
Total wounded, killed, and died of wounds.....		
		2,596
Deaths (disease and accidents):		
Officers	117	
Men	3,437	
		3,554
Resignations		
		37
Desertions		
		2,247

NEW ESTABLISHMENT (11,186).

Discharged:		
Expiration of service	12	
Disability	767	
By order and civil authority	114	
		893
Killed in battle:		
Officers	5	
Men	62	
		67
Died of wounds:		
Officers	5	
Men	71	
		76
Deaths (disease and accidents):		
Officers	46	
Men	2,218	
		2,264
Wounded:		
Officers	36	
Men	236	
		272
Total wounded, killed, and died of wounds		
		415
Total killed, wounded, and died of wounds, Regular Army		
		2,946
Resignations		
		92
Desertions		
		602

MARINES.

Killed and died of wounds		9
Deaths (disease, etc.)		3
Total		12

VOLUNTEERS (73,260).

Discharged:	
Disability.....	7,300
Other causes.....	1,697
Killed in battle and died of wounds.....	607
Killed and wounded ^a	1,831
Deaths from disease and accident.....	6,408
Resignations.....	279
Desertions.....	3,876

The number killed, wounded, and died of wounds, in the three classes of troops was as follows:

Regulars (19,290), old establishment.....	2,595
Regulars (11,186), new establishment.....	415
Volunteers (73,260).....	^a 1,831

The losses in killed and died of wounds among the volunteers were distributed as follows:

Three and six months' men (12,601).....	16
Twelve months' men (27,063).....	439
Volunteers for the war (33,596).....	152
Total ^b	607

The deaths from disease and accidents were as follows:

Three and six months' men.....	129
Twelve months' men.....	1,859
Volunteers for the war.....	4,420
Total ^c	6,408

Of the 16 killed or died of wounds among the three and six months' men (all held for three months), 15 belonged to the Texas rangers, two companies of whom were organized by General Taylor before leaving Corpus Christi, and who were with him in the skirmishes preceding Palo Alto.

This loss of but one man among the remaining 12,000, who were called out too late to participate in the battle of Palo Alto and for too short a period to be available for operations beyond the Rio Grande, indicates how useless was their service.

The same remark applies with almost equal force to the 33,000 volunteers for the war, called out to replace the 27,000 men who had had the benefit of a year's campaign and instruction. An analysis of their losses shows that of the 152 killed and died of wounds, 118 fell upon the four regiments (the Second New York, First and Second Pennsylvania, and First South Carolina), which were with Scott's army at Cerro Gordo and remained with it till the hour of its triumph. Thus it appears that, excepting the Texas rangers from the three and six

^a The killed and wounded in the entire force of volunteers is taken from the Statistical Report of the Surgeon-General, Ex. Doc. No. 96, Senate, Thirty-fourth Congress, first session, p. 621. This number is taken in preference to 1,778, computed from Ex. Doc. No. 24, H. R., Thirty-first Congress, first session; both are based on figures of the Adjutant-General, compiled from the reports of commanders and regimental and company returns. As stated by the Adjutant-General, "The statistics of the war are given as close approximation only."

^b House Ex. Doc. No. 24, Thirty-first Congress, first session, pp. 23, 24, 25, 26, Table C.

^c House Ex. Doc. No. 24, Thirty-first Congress, first session, pp. 23, 24, 25, 26, 27 Table C.

months' men and the four gallant regiments which entered the Mexican capital from the volunteers called out for the war, the total loss among more than 42,000 men was but 35 in killed and died of their wounds.

If we choose to carry the argument further and add to the 42,000 the 11,000 new regulars who were likewise called out to repair the mistake of twelve-month enlistments, it will appear that we had more than 53,000 men in the service, whose losses in killed and died of wounds numbered but 178.^a Laying aside the President's responsibility for this result, it is important to observe that 12,000 of these men (militia) were called out because our defective laws gave the President no power to increase the rank and file of the Army, while 41,000 were called out to remedy another legislative blunder which permitted him to accept volunteers for twelve months instead of for the war.

To establish the fact that these 41,000 men, regulars and volunteers, need not have been summoned to the field except to retrieve errors of statesmanship, self-evident to the military mind, we have only to state that the old army recruited to 19,000, added to the 27,000 volunteers, had the latter been accepted for the war, would have given the Government a permanent force of 46,000 men. Contrasted with this number the greatest strength of the Mexican army was never estimated to exceed 36,000 men. As these conclusions bear solely on the extravagance of our system, it is possible that they may be lightly considered under the popular conviction that in time of peace our economy more than offsets the prodigality of war, but there are other considerations of deeper import than dollars and cents. In a government of the people and for the people, more than in any other, it is the duty of statesmen to study the means of preserving life as well as property, yet history shows that in proportion as the national treasure has been squandered, have the lives of our brave and patriotic citizen soldiers been thrown away.

As an evidence of the penalty paid for entrusting raw troops to inexperienced officers who knew nothing of the principles governing their diet and health, let us again recur to statistics, taking, for example, the deaths by disease in the old and new regular regiments. A comparison of these figures shows that while the old army, numbering from first to last 19,290, was exposed for more than two years to a sickly climate and lost 2,574 enlisted men, or at the rate of $6\frac{1}{2}$ per cent per annum, the new establishment, numbering but 11,186, lost in less than a year 2,055, or at the rate of 19 per cent per annum—a loss three times as great as the old regiments.

That this loss might have been much lessened had their field officers been selected from the old regiments, scarcely admits of denial. Other figures may be quoted which should not escape the attention of the philanthropist. If it be admitted that but for the unfortunate option granted by the law, the 27,000 volunteers first called out, in connection with the old regular establishment, would have been sufficient to bring the war to a speedy termination, then it must also be granted

^a At the battle of Salem Heights or Chancellorsville the One hundred and twenty-first New York Volunteers, after six months' training under a regular officer, went into action with 8 companies, numbering 458 men, and lost 228 killed and wounded, of whom 92 were killed and died of their wounds. This loss of part of a regiment in a single battle exceeded one-half of the loss of 53,000 men who served in the Mexican war.

that the men who died of disease in the new regular regiments and among the 33,000 volunteers afterwards called out for the war, were the victims of unwise legislation.

This number was as follows:

New regular regiments:	
Officers.....	36
Men.....	2, 055
Volunteers for the war:	
Officers and men.....	4, 309
By accident in both classes.....	141
Total.....	6, 541

In addition the number of men discharged (in ruined health) for disability was:

New regular regiments.....	767
Volunteers for the war.....	2, 763
Total.....	3, 530

In paying a just tribute to the patriots who forsook their homes to go to a distant land, there to face the ravages of death in defense of the honor of the country, President Polk in his message to Congress, December, 1846, stated:

Well may the American people be proud of the energy and gallantry of our regular and volunteer officers and soldiers. The events of these few months afford a gratifying proof that our country can, under any emergency, confidently rely for the maintenance of her honor and the defense of her rights on an effective force ready at all times voluntarily to relinquish the comforts of home for the perils and privations of the camp. And though such a force may be for the time expensive it is in the end economical, as the ability to command it removes the necessity of employing a large standing army in time of peace and proves that our people love their institutions and are ever ready to defend and protect them.^a

The views expressed in these lines undoubtedly represent the average conviction of our people if not of our statesmen. Firmly convinced that in reducing the strength of the Regular Army without making any provision for its expansion, our system "is in the end economical," our representatives have suffered military organization to be neglected till in a moment of excitement, laws have been enacted, without debate, a single defect of which, like the short enlistment clause of the act of May, 1846, may entail the sacrifice of more than 6,000 men.

COST OF THE WAR.

The money disbursed by the pay department to the various classes of troops during the Mexican war was as follows:

Permanent regular troops.....	\$2, 800, 000
Additional regular troops.....	2, 294, 427
Volunteers.....	10, 083, 016
Total.....	15, 177, 443

The mere pay of troops is, however, but a small portion of the expense of carrying on war, as is shown by the following table, which

^aHouse Ex. Doc. No. 4, Twenty-ninth Congress, second session, p. 22.

^bFigures furnished by Pay Department.

gives the expenditures of the War and Navy departments from the close of the Florida war to the year 1849:

	War.	Navy.
1843 ^a	\$2,908,671.95	\$3,727,711.53
1844.....	5,218,183.66	6,498,190.11
1845.....	5,746,291.28	6,297,177.89
	13,873,146.89	16,523,088.53
1846.....	10,413,370.58	6,455,013.92
1847.....	25,840,080.33	7,900,635.76
1848.....	27,688,334.21	9,408,476.02
1849.....	14,568,473.26	9,786,705.92
	88,500,208.38	88,550,881.62

^a For the half year from January 1, 1843, to June 30, 1843.

These figures show that while by reducing the Army to 8,000 men the expenditures during the two and a half years preceding the war were but \$13,873,146.89, or at the rate of \$5,549,258.75 per annum, the expenditures for the next four years were \$88,500,208.38, or at the rate of \$17,700,041.67 per annum.

LESSONS OF THE WAR.

Notwithstanding its unnecessary prolongation the Mexican war marked a great change if not a revolution in our military policy. This result was due to the decay and gradual abandonment of the militia system which up to that time had been regarded as the "great bulwark of national defense." Bearing in mind that the laws under which military operations were prosecuted were almost identical with the laws of 1812 let us examine the composition of the forces employed in the two wars:

	War of 1812.	War with Mexico.
Regulars.....	^a 50,000	31,024
Militia.....	458,463	12,601
Volunteers and rangers.....	13,159	^b 60,659
Total.....	521,622	104,284

^a This figure is approximate. The return for September, 1814, gave the aggregate strength of the Army at 33,186. The report of the Commissioner of Pensions for 1874, p. 80, gives the number of men, including sailors and marines, who served twelve months or more, at 63,179. From this estimate there should still be deducted twelve months' rangers and volunteers.

^b In the Mexican war it will be remembered that 11,211 men were mustered in for six months, but held only for three, the legal term of the militia. In reality these men, as also in all probability the 1,390, should be considered volunteers rather than militia, inasmuch as militia service was no longer obligatory in any of the States.

The percentage of the different classes of troops to the total number of men employed in the two wars was as follows:

	War of 1812.	Mexican war.
Total force.....	521,622	104,284
Regulars.....per cent..	10	30
Militia.....do..	88	12
Volunteers and rangers.....do..	2	58

A comparison of these figures shows that while in the War of 1812 the combined force of regulars and volunteers of twelve or more months' service was but 12 per cent of the total number of troops employed, the same force in the Mexican war was no less than 88 per cent. The contrast does not stop here. In the first war, relying upon the States instead of appealing directly to the people as intended by the Constitution, Congress became a witness of disasters like those which occurred in the Revolution; in the second, the national troops, organized and supported by Congress, achieved a series of victories unmarred by a single defeat.

In one war, an army of more than 6,000 raw troops, posted in the defense of our own capital, fled with a loss of but 19 killed and wounded; in the other a force of less than 5,000 trained volunteers, supported by a few regular troops, overthrew a Mexican army of four times its number.

In one war, an enemy numbering less than 5,000 men baffled all of our efforts at invasion; in the other our army, with less than 6,000 combatants, entered in triumph the enemy's capital.

But the difference between the results of the two wars is not wholly to be ascribed to the substitution of national volunteers for the militia. In the war of 1812 the Regular Army, which had itself to be created, was unable to furnish a standard of skill and discipline. In the Mexican war, aside from sustaining the principal losses in killed and wounded, it furnished able commanders, and in every field set an example of skill, fortitude, and courage.

As to the influence of military education in producing such diversity of results, General Scott, who, in 1814, was compelled to teach the regular officers of his brigade the elements of squad drill, left his views to the Senate in the memorable words:

I give it as my fixed opinion that but for our graduated cadets the war between the United States and Mexico might, and probably would, have lasted some four or five years, with, in its first half, more defeats than victories falling to our share; whereas in less than two campaigns we conquered a great country and a peace without the loss of a single battle or skirmish.^a

^aCullum's Biographical Register of the Officers and Graduates of the United States Military Academy, preface, vol. 1, p. 11.



PENSIONS FOR
SURVIVORS OF CERTAIN INDIAN WARS

HEARINGS

BEFORE A

SUBCOMMITTEE OF
THE COMMITTEE ON PENSIONS

HOUSE OF REPRESENTATIVES

COMPOSED OF

EDWARD KEATING, *Chairman*

HARRY H. DALE

SAM R. SELLS

HAVING UNDER CONSIDERATION VARIOUS BILLS INTRODUCED
AND REFERRED TO THE COMMITTEE ON PENSIONS FOR
THE PURPOSE OF PENSIONING THE SURVIVORS
OF THE INDIAN WARS THAT OCCURRED
AFTER THE LATE CIVIL WAR

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SUBCOMMITTEE.

EDWARD KEATING, Colorado, *Chairman.*

HARRY H. DALE, New York.

SAM R. SELLS, Tennessee.

C. L. WARRS, *Clerk.*

WALLACE HILL, *Assistant Clerk.*

PENSIONS FOR SURVIVORS OF CERTAIN INDIAN WARS.

SUBCOMMITTEE OF THE COMMITTEE ON PENSIONS,
HOUSE OF REPRESENTATIVES,
Washington, March 7, 1914.

The subcommittee met at 8 o'clock p. m., Hon. Edward Keating presiding.

Mr. KEATING. A subcommittee consisting of Mr. Sells, of Tennessee, Mr. Dale, of New York, and myself, has been named by the Committee on Pensions to conduct hearings on the various bills introduced for the purpose of pensioning the survivors of the Indian wars, that is, those Indian wars that occurred after the Civil War.

I have here a communication that I think should be put into the record from C. R. Hauser, secretary of the National Indian War Veterans' Association, of 2721 Gilpin Street, Denver, Colo. The National Indian War Veterans' Association, is made up, as its name would indicate, of men who participated in these various Indian wars, and it has been particularly active in attempting to secure legislation of the kind under consideration to-night. This letter is addressed to myself, dated at Denver, and reads as follows:

DENVER, COLO., *February 24, 1914.*

HON. EDWARD KEATING,
Washington, D. C.:

The National Indian War Veterans' Association was organized in Denver, Colo., April, 1909, and numbers at present 485 members. These men were mostly former ex-United States soldiers, though there are a few who served in the Texas Rangers and in the Eighteenth and Nineteenth Kansas Volunteer Cavalry in campaigns against hostile Indians.

The objects of the association were published in thousands of newspapers, magazines, and periodicals published in every section of the United States, and men eligible to the organization were called upon to join and send their names, addresses, date of service, and names of the Indian campaigns in which they participated to the secretary of the order. It is only just to say that with the enormous amount of favorable publicity which has been given the association and its object by the press of the country, from the Atlantic to the Pacific coast and from the Gulf to the British possessions, the results as a whole have been lamentably small. The secretary of the order has to-day in his possession the names and addresses of about 1,200 men who are eligible to our association, and who would become beneficiaries under the bill H. R. 1672, besides the enrolled members of the order, and that is the full result that can be shown for over three years of the most earnest and thorough endeavors to bring these frontier soldiers into line.

The reasons for this are not very far to seek, for after the close of the Civil War, 1865, the Regular Army of the United States was composed to a great extent of men who had served during the Rebellion, these men, enlisting after the close of the Civil War, were mostly men from 25 to 35 years of age, and it must be admitted by even a casual observer that of the men who served on the frontiers from 1865 to 1875 very few are alive to-day, as a survivor would to-day be, "should he have enlisted in 1865 at the age of 25 years," 73 years of age. The men who enlisted in the Army after 1875 were as a rule younger men, yet these men to-day are, what few are left, from 60 to 65 years of age.

It is a matter of grave doubt whether the services, that these ex-soldiers performed on our frontiers, could be excelled in hardships, suffering, and hazardouesness, by the services of any other soldiers, even in the service of this Government, not excepting

the soldiers of the War of Independence and the Civil War. These troops fought in small bodies in a practically uninhabited, hostile country against the most treacherous, cruel; yet brave and daring foes.

The men who participated in these Indian wars and campaigns knew well what fate had in store for them should they be unfortunate enough to fall alive into the hands of their relentless savage foes, for death by fire and torture awaited them. It is an admitted fact by the most renowned authorities on military matters of the United States, including such well-known generals as Sherman, Miles, Merritt, Forsyth and many more that the services that the soldiers were called upon to perform in the early days of the Indian frontiers were far greater in hardships, in severity and danger than even the services performed by the soldiers of the Civil War.

Small bodies of these soldiers protected hundreds of miles of frontiers, no hardship was too great, no march too long for these soldiers when the lives of settlers or emigrants were in peril, and though the old frontiersman is fast disappearing, yet there are some alive to-day in Texas, Arizona, Nebraska, New Mexico, Wyoming, the Dakotas, and Idaho, Kansas, and Colorado, who have not yet forgotten the joy they experienced when the news came that the soldiers are coming, for well they knew that with the soldier came peace and security.

In the mountains of Arizona and Oregon, on the wind-swept plains of Kansas and Nebraska, on the burning deserts of Texas and Indian Territory, and the bitter cold of our northern frontier posts these ex-soldiers served well and faithfully, and is it to be wondered at that their number is now so woefully small. No, the wonder is that any of those early frontier defenders are alive to-day. The mortality among these ex-soldiers is very great, having amounted to 11 per cent during the last two years, and of course it will become greater year by year.

It is safe to assert that the number of applicants who will become beneficiaries under the act of H. R. 1672 will fall far short of 5,000, for it must be remembered that many of the men who should profit by the benefits of the bill live in isolated places, on farms, ranches, small settlements, and mining camps, in fact in places where they never will hear of the bill passed for their relief, and I base this assertion on the proven fact that if these survivors of our Indian wars have not heard of the existence of the Order of National Indian War Veterans, which has been advertised more extensively than any other order in the United States during the last three years, they never will hear of or will heed the substance of any act passed in their favor. While it is sad to have to say this, yet it undoubtedly will prove true.

Referring to the number of men who took part in Indian wars, as a rule the numbers who participated in the various campaigns were small, not often being over 300 men, and it is safe to say that the summer and winter campaigns of 1876 and 1877 showed the greatest number of soldiers in the field. The War Department can no doubt furnish a very fair estimate of the number of participants in each of the campaigns enumerated in H. R. 1672; and the number of widows of ex-soldiers who can benefit by the passage of this bill will, judging from all the information which I have been enabled to receive during the last three years, be very limited, the same statement applying to minor children.

Very truly, yours,

C. R. HAUSER,
Secretary National Indian War Veterans' Association.

If it is agreeable to the committee and those Members of Congress who are here anxious to present the features of their bills, I think it would be well to hear from Gen. Baldwin. General, the subject before us, as you know, is a proposition looking to the pensioning of the officers and soldiers who served in the Indian wars following the Civil War. The committee would like to have your views on that subject, particularly as to how far we should carry the legislation, what conflicts or disturbances should be considered Indian wars, and anything else that may suggest itself to you along those lines.

STATEMENT OF GEN. FRANK D. BALDWIN.

Gen. BALDWIN. Well, I have hardly got the question in my mind so that I would be able to talk about it understandingly. If I could get exactly the points you want to arrive at, I could possibly give direct

information on the points you desire to be informed on, as far as I am able to do so. I suppose, from what I heard read, that this refers to regular soldiers, and not volunteers who assisted out there.

Mr. KEATING. Perhaps the better way to proceed, then, would be to permit these gentlemen who have formulated the legislation to present their views, and then we could get your comments upon the legislation they propose and as to whether it would be sufficient and really covered the ground.

Gen. BALDWIN. That would be, I should say, the best way, so as to give me the line of reasoning upon which to talk.

Mr. KEATING. If that is satisfactory, then we will hear from Mr. Nolan of California.

STATEMENT OF HON. JOHN I. NOLAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA.

Mr. NOLAN. I have not presented a bill but my colleague from California, Mr. J. R. Knowland, has presented a bill on this subject.

I wish to state, Mr. Chairman and members of the subcommittee, that there is a camp of National Indian War Veterans in San Francisco, Camp No. 4, but it is not particularly on that account that I have taken so much interest in this proposed legislation. Those of us who come from the West realize, from the history that has been written by those who blazed the trail in the early days, especially those who staked our far western outposts, the hardships suffered, and especially by those veterans who had to contend with hostile bands of Indians and particularly when the Indians were on a rampage. It is not a question of pensioning a few men, but it is, to my mind, a matter of justice long delayed to a lot of men who served their country well and served it faithfully, in fact, some of the best fighting men our Army ever possessed. There are not so many of these men on the Pacific coast, they are scattered around, but they think the time has come for them to get recognition from the United States Government and feel it ought to be in the way of a pension bill. The bill that they have corresponded with me about is H. R. 1672, and was introduced by Mr. Taylor, of Colorado. I understand there are a number of bills, but I will leave it to the good judgment of the committee to select what it deems the wisest bill or to amend any of these bills in such way as to give these men justice.

I have a letter from the secretary of San Francisco Camp No. 4, in which that camp offers certain amendments. I will read it and ask that it be included in the record.

SAN FRANCISCO, CAL., *January 11, 1914.*

HON. JOHN I. NOLAN, M. C.,
Washington, D. C.

DEAR SIR: I inclose you a letter from our national headquarters, Denver, Colo., urging the passage of the Taylor bill. We are in favor of this bill, but we want it amended so that the age limit will be stricken out. Line 13 of the bill says, "who may now have arrived at the age of 62 years." We want all this cut out, and we want the bill to embrace the war with Apaches in the Mogollon Mountains, Ariz., 1881, where 35 were killed of the Indians, Sergt. Miller of the Army killed, several soldiers wounded. Here the enlisted Indians turned on the soldiers. Five of them were hung by order of court-martial at Fort Grant, Ariz., and several more sent to Yuma Penitentiary. Again, the greatest campaign of them all, the Sierra Madre of 1883, under Gen. Crook, when United States soldiers went to Mexico after Geronimo and his band, capturing 270 warriors and returning them to the Indian Reservation at San Carlos. The Indians

had six Mexican women prisoners, which were rescued from them after the surrender and were taken back to the United States and turned over to the Mexican consul at Tucson, Ariz. This was after the massacre of Judge MacComas and his family at Winchester, Ariz., and of several other citizens of lesser note. A misunderstanding between Gen. Crook and the War Department, who were at outs as to Crook's permitting the Indians to keep their arms after their surrender, deprived the participants in the expedition being entitled to an Indian war or campaign, by small politics on the part of the War Department or the division department. Some one was to blame; not the soldiers or subofficers in command.

Hoping you will do the best you can for us, I remain,

Respectfully, yours,

J. H. DOLAN,

410 Harrison Street, San Francisco, Cal.

Mr. Chairman, I would also like to file a circular signed by Col. Meddaugh, of Elmira, N. Y., and C. R. Hauser, of Denver, Colo., officers of this association, giving eight reasons why this legislation should be enacted.

THE REASON WHY H. R. 1672, INTRODUCED BY MR. EDWARD T. TAYLOR, M. C., FROM COLORADO, SHOULD BE PASSED.

1. The soldiers who served on the frontiers against hostile Indians, from after the close of the Civil War until 1891, performed services equal to those of the veterans of the Revolution and the Civil War.

2. The fact that the Government has been tardy in recognizing and taking care of the veterans of our Indian wars is no reason why it should continue to do so.

3. Every Member of Congress, especially those from west of the Mississippi, should feel it his duty to provide for these veterans, who braved the dangers and hardships incidental to Indian warfare.

4. These survivors of the Indian wars, who for small remuneration underwent many hardships, who blazed the way for the settlement of our frontier countries, and who protected the emigrant and settler, have deserved well from the Government that they upheld and served so faithfully, and should be recognized on the same basis as the veterans of the Civil War.

5. It is a well-known and indisputable fact that Indians wars had a horror of their own; the soldier who served in them faced and braved conditions unknown to survivors of our other wars.

6. Most of the survivors of these Indian wars are now old men, the privations endured by them during their years of service having undermined and shattered their health, rendering them unfit for hard labor in the sunset of their lives, and every United States Senator and Member of Congress should use his influence to have Mr. Taylor's bill, H. R. 1672, passed, so that these brave ex-soldiers will not become objects of public charity.

7. It is erroneous to suppose that there will be numerous applications for relief under this act, as years of researches have brought to light that there are four or five thousand of these veterans, who can become beneficiaries, after the bill becomes a law.

8. The veterans of these Indian wars are, as a rule, poor men, who have not the means to uphold expensive lobbyists in their behalf; they rely implicitly in the justice of their request, as set forth in Mr. Taylor's bill, and on the well-known fairness in such matters of the honorable gentlemen who represent them in the Halls of Congress, and look to them that belated justice be done the survivors of our Indian wars.

Col. S. L. MEDDAUGH, *Elmira, N. Y.*

C. R. HAUSER, *Denver, Colo.*

We can all recollect some years back when the soldiers were in the Indian campaigns. The more recent one that I can recollect was the Apache campaign in Arizona, when the Indians down there went out on raids and the soldiers suffered severe hardships. The character of the warfare was such that it made it pretty hard on the troops and their officers, and it seems to me that that general condition prevailed throughout all the Middle West as well as the great far West in the early days, as far as these Indian campaigns were concerned. These men have rendered efficient service to their country. A good

many of them in their old days, because of the hardships they endured, are suffering and are broken in health. It is a matter of justice they are asking. If the veterans of the Civil War are entitled to a pensionable status, if the veterans of the Spanish War are entitled to a pensionable status, I think these men, some of whom served many years in the United States Army, ought to receive some consideration at the hands of Congress. As stated in the communication from their national headquarters there are not a great many survivors, at the most between five and six thousand, as far as they can ascertain. How many of them would apply for a pension it is hard to estimate, but I think it would befit our Government to recognize these men and recognize the services they have rendered the people, and especially the pioneers of the country who blazed the way of civilization in the West and who made a trail for the people who followed. The pioneers were there before the railroads came; their way was hard and the only police they knew, after a great deal of effort on their part to get protection, were the United States Army, and these soldiers were the men who are now asking for recognition.

These men suffered severe hardships, and I think they are entitled to recognition at this late day. I trust this committee will see its way clear to recommend a bill giving them a small measure of justice in return for their great service.

Mr. KEATING. Mr. Johnson will be the next one we will hear.

**STATEMENT OF HON. JACOB JOHNSON, A REPRESENTATIVE
IN CONGRESS FROM THE STATE OF UTAH.**

Mr. JOHNSON. Mr. Chairman, I have not presented a bill and I am not advised whether my colleague from Utah, Mr. Howell, has introduced a bill on this subject or not.

Mr. SMITH of Idaho. I think he has—two of them.

Mr. JOHNSON. I have not examined his bills, but I hardly think they refer to persons who were regularly enlisted in the United States forces, but perhaps more particularly to those who served in the local militia of the Territory. Personally I can see no reason why those soldiers who served under United States authority in the Regular Army in Indian wars should not be entitled to pensions the same as those who served in any other wars. But my contention is, Mr. Chairman and gentlemen, that we should go beyond that. Although the soldiers who were in the Regular Army rendered great and efficient service to the settlers who settled in Western States and Territories—and perhaps but for them the settlement might have been retarded for many years—yet those who served in the regularly Organized Militia of those respective Territories, such as Utah, Nevada, Idaho, Montana, and those other Territories were regularly enlisted in the Territorial Militia and rendered military service in the suppression of these Indian outbreaks, and I can see no reason why they should not be included. As has been said, there are, perhaps, but few of them alive to-day, and some of them in Utah, my State, I know to be very needy, and even though the pension should be small I know that it would be very gratefully received by many of them who are in a condition that they need it. That is perhaps all that I ought to say in the matter. My position is that as to those who served in the United States forces there should not be any ques-

tion about the granting of pensions but, as before stated, I think that those who served regularly in the Territorial Militia, the Organized Militia, and who endured the same hardships as those in the Regular Army, should also be included. I think it would not require a very large sum to meet the amount necessary.

I will say that in my State there has been considerable clamor by these men to obtain some little relief, so that at the last session of the legislature of the State of Utah an appropriation of \$50,000 was made for the payment of these men. But it amounted to but a small sum to each. I think it was only intended to pay them for a month or two of service. It was recognized that it was not what they ought to have, but many of them were in great need of assistance, being aged people, and the State did that for them.

Mr. SELLS. Do you know how much each man received of the appropriation made by the State of Utah?

Mr. JOHNSON. No; I do not. I left before a distribution of it had been made. I talked to our governor about a week ago, while he was in Washington, and he promised to send me a list of the men who had received this money and the amount received by each man. I have not yet received that, as he has but recently returned home.

Mr. SELLS. Do you know how many men received it?

Mr. JOHNSON. No; I do not know. But I understand that there were somewhere near 2,000 who participated in that fund.

Mr. SELLS. That is in the State of Utah alone?

Mr. JOHNSON. Yes, sir.

Mr. KEATING. I presume those men would be covered by these two bills introduced by Mr. Howell.

Mr. JOHNSON. Probably; but I will say that I am not familiar with the terms of them. There was an act passed some years ago by the terms of which these people could go before the Court of Claims and present their claims, not so much for the services actually rendered by them as for property destroyed. But I want to say that they found it so expensive to present their claims here that but few presented them, and I have not heard of anyone who received anything for property destroyed. One man would lose a horse or team and another would lose a few head of cattle. The losses were not great in the individual cases, but in the aggregate amounted to considerable. However, I do not think they ever received anything. The expense of presenting their claims here was so great and the amounts so small that they could not present them. I had in mind the preparation of a bill permitting them to commence their action in the United States district court in the district in which they reside, so as to avoid the necessity of the great expense incident to the presentation of their claims here at Washington, but I have not yet done so. Of course that is a matter outside of this proposition. But, aside from that, I personally am acquainted with a number of the men. They are aged now, but they served in this territorial militia; a number were killed, some wounded, and many of them served a considerable time, not the whole year, because in the winter time in that section of the country we had no Indian troubles, at least I do not know of their having had any Indian troubles in the winter time. It was during the season of the year when the snow had disappeared from the mountains, when the Indians could live in the mountains, make their raids down in the valley, attack the settlers and drive away their

stock. There was the regularly Organized Militia, and the record is at hand of the people composing that militia and the amount of service rendered by each individual. I would like to see a bill broad enough to include those men who performed actual service and who suffered the same hardships and, perhaps, greater hardships than the actual military, because the military, of course, were provided by the Government with their rations and with accoutrements, whilst these other people furnished their own sustenance, their own arms, ammunition, their mounts, and everything used in the campaign.

Mr. KEATING. Do you know of any publication which contains the story of the service of these members of the Utah militia? I notice in Mr. Howell's bill that he speaks of the Utah volunteers who served during the years from 1865 to 1868, inclusive. Now, you say that some 2,000 participated in the distribution of the fund provided by the State of Utah. If so large a number were engaged in the war it must have been a conflict of some importance and it seems to me you should be able to secure some history of the event.

Mr. JOHNSON. Undoubtedly, Mr. Chairman, there is a record of it kept by the officers of that militia. It will be observed that the then Territory, now a State, was more than 300 miles in length, north and south, settled throughout the whole length to a limited extent and, of course, it required a considerable number of men to protect the settlers in that whole area of country. They were distributed, as I understand, in small companies throughout this area of 300 miles in extent, and whilst there have been, as I understand, no very great conflicts—I mean by that no great battles in which a large number of people were killed—yet it frequently happened that in those conflicts small numbers were killed, that is, where small fights occurred, perhaps six, eight, or ten men being killed and also a number of Indians, but no serious fights. I apprehend a record of it could be obtained, although I have not such a record. If a bill should pass in which these people were included, of course, it would be looked up.

The adjutant general of the State of Utah was appointed by the legislature to disburse this \$50,000, and I had a conversation with him here in Washington probably a month ago in which he told me that he had paid out the last cent. He told me he had a full list of the participants in that fund and would send it to me. The governor promised to forward it to me as soon as he returned home, which would give a list of the now living members of that Militia.

Mr. KEATING. I would suggest that you communicate with the governor and have him prepare the story of the fight in which these men participated.

Mr. JOHNSON. Yes, sir.

Mr. KEATING. You will probably find he will be able to get the data together.

Mr. JOHNSON. Yes.

STATEMENT OF HON. VICTOR MURDOCK, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF KANSAS.

Mr. MURDOCK. I am here, as is Mr. Taggart, in support of two bills which propose to extend the provisions of the act of June 27, 1890 to the Eighteenth and Nineteenth Kansas Volunteer Cavalry.

These regiments were mustered into the regular military service of the United States and they are the only two volunteer regiments in the country that do not enjoy the benefits of the law of 1890 and acts amendatory thereof. They are pensionable under the general law for disabilities incurred in the service and line of duty.

I could not stifle a bit of sentiment if I would at this particular moment. In order to refresh my memory in the history of these two regiments, this afternoon I went into the records and I found an old document which was printed at the time a similar measure to these passed the House. This was in the Fifty-third Congress. The bill failed in the Senate. And my sentimental touch came about through this circumstance. I was reared in a town which in the beginning stood at the margin of civilization, Wichita, Kans. In my youth a great many of the incidents which I find recited in the history of one of these regiments, the Nineteenth Kansas, were known to me and to every child in the community. Our town was a town which was frequented by Texas cowboys who drove herds northward to meet the railroad which had its terminal there and by blanketed and feathered Indians who visited us from what was then Indian Territory. I knew in my boyhood of Santanta, an Indian chief mentioned in these documents. I have known in my time two Indian traders who told me, on separate occasions, that Santanta—and Gen. Baldwin sitting here may have known him—was the strongest man physically that they had ever known. Mr. James R. Meade, an Indian trader of my State, told me—and he was a man of great veracity—that he saw Santanta draw so strong a bow that an arrow shot through a buffalo stuck in the ground on the other side. My youth in early Wichita was occasionally punctuated by a repetition of the scenes which caused the creation of these two regiments. For as late as 1877 an occasional and happily unfounded Indian scare would cause the settlers to pour into town and camp about among us until the scare passed.

The Eighteenth and Nineteenth Kansas Regiments were called into being after the Civil War by reason of continued Indian depredations on the prairies. Between 1862 and 1868 there were in all about 800 people murdered, and following the Civil War an attempt was made to end this state of affairs. These two Kansas volunteer regiments were mustered into the service. The Eighteenth Regiment had a rather unfortunate career, as I read its history and as I have talked to men who served in it. At Fort Harker it was overcome by cholera, and I think I can give the exact mortality figures. If I can not, Mr. Taggart can. I know that 20 deaths occurred in one battalion. The Eighteenth Regiment quickly saw actual service.

On the 21st and 22d of August, 1867, Companies B and C of this battalion were in an engagement with the Cheyenne Indians on Prairie Dog Creek, in Kansas, with a loss of 14 officers and men killed and wounded, and Maj. Armes, of the Tenth United States Cavalry, commends in the highest terms the officers and men of the Eighteenth who took part in this engagement in saving the State of Kansas from further depredations from the Indians.

Mr. FRENCH. Is that the Gen. Armes whose case we have considered?

Mr. MURDOCK. Yes; I think that is the same officer.

In his report the governor of Kansas says: "On the 30th of August, Maj. Moore, with the Eighteenth Kansas, struck a portion of the Indians who had engaged Maj. Armes on the 21st and 22d, and after an engagement of several hours gained a decisive vic-

tory. About the same time Maj. Elliott, with a detachment of the Seventh United States Cavalry, attacked another band and drove them in a westerly direction toward the headwaters of the Republican. After these several engagements, the Indians retired to their winter haunts and left the frontier settlements of Kansas comparatively at peace."

Now, the men of the Nineteenth Kansas Cavalry were mustered into the United States service in the last days of October.

Mr. KEATING. What year?

Mr. MURDOCK. 1868. And they had a very trying experience and performed so well during it that they received praise of the very highest kind from Gen. Sheridan. I have talked with many men who were in this regiment. The regiment started from Topeka, Kans., and in November camped at the junction of the two rivers where my city is now located—it was then an Indian village—and moved on down in the direction of Camp Supply, which was in what is now Oklahoma. During that march the regiment lost its way, being overtaken by a snowstorm. The regiment lived on short rations and latterly upon buffalo meat and finally literally starved for a distressing period of time, until they could extract themselves and reach the Regulars who were at that time at Camp Supply. Following this incident, and it was one of the greatest hardships, came others of equal difficulty. Of the subsequent campaign Gen. Sheridan said:

The snow was still on the ground and the weather was very cold, but the officers and men were very cheerful, although the men had only shelter tents. We moved due south until we struck the Washita, near Custer's fight of November 27, having crossed the main Canadian, with the thermometer about 18° below zero.

That is very exceptional weather for that latitude.

On the next day we started down the Washita, following the Indian trail, but finding so many deep ravines and canyons I thought we would move out on the divide; but a blinding snowstorm coming on, and fearing to get lost, with a large command and train of wagons, on a treeless prairie without water, we were forced back to the banks of the Washita, where we at least could get wood and water.

This was continued until the evening of the 16th of December, when we came to the vicinity of the Indians, principally Kiowas. They did not dream that any soldiers could operate in such cold and inclement weather, and we marched down on them before they knew of our presence in the country.

That is from the report made by Gen. Sheridan. I quote this from the document I have referred to:

The result of this campaign was that Santanta and Lone Wolf, chiefs of the Kiowas, were taken prisoners, and, by a threat of execution, that tribe was forced to report at Fort Cobb, together with the Comanches and Apaches, and finally induced to go on their reservation. From Fort Cobb the command marched to the base of the Washita Mountains and established Fort Sill, near Medicine Bluff. On the 2d of March following, the Nineteenth Kansas Cavalry and the Seventh United States Cavalry, under the command of Gen. Custer, went in pursuit of the Cheyennes. The course pursued was via Camp Radiminaki, mouth of Elk Creek, to a point on North Fork of Red River, a few miles above the mouth of Salt Fork.

The general goes on and details the campaign. Gen. Custer is also on record in regard to this expedition. He says in his official report:

The point at which we found the Cheyenne village was in Texas, on the Sweetwater, about 10 miles west of the State line. Before closing my report I desire to call the attention of the major general commanding to the unvarying good conduct of this command since it undertook the march. We started with all the rations and forage that could be obtained, neither sufficient for the time for which we have already been out. First it became necessary to reduce the amount of rations, afterwards a still greater reduction was necessary, and to-night most of my men made their suppers

from the flesh of mules that have died on the march to-day from starvation. When called upon to move in light marching order, they abandoned tents and blankets without a murmur, although much of the march has been made during the severest winter weather I have experienced in this latitude. The horses and mules of this command have subsisted day after day upon nothing but green cottonwood bark.

And, Mr. Chairman, I know you are from the West, and I can imagine nothing with less substance in it than green cottonwood bark, unless it would be dry cottonwood bark. To continue with Gen. Custer's report:

During all these privations the officers and men maintained a most cheerful spirit, and I know not which I admire most, their gallantry in battle, or the patient but unwavering persistence and energy with which they have withstood the many disagreeable ordeals of this campaign. As the term of service of the Nineteenth Kansas Cavalry is approaching its termination and I may not again have the satisfaction of commanding them during active operations, I desire to commend them, officers and men, to the favorable notice of the commanding general. Serving on foot, they have marched in a manner and at a rate that would put some of the Regular regiments of Infantry to the blush. Instead of crying out for empty wagons to transport them, each morning every man marched with his troops, and, what might be taken as an example by some of the line officers of the Regular Infantry, company officers marched regularly on foot at the head of their respective companies, and now, when approaching the termination of a march of over 300 miles on greatly deficient rations, I have yet to see the first straggler.

I have no more to say at present, Mr. Chairman, save this: I believe that these bills have merit. Certainly these men performed distinguished service. They underwent great privations. They constitute the only two Volunteer regiments of that period that are not beneficiaries under the act of 1890. The committee, I think, could recommend to the House the passage of these bills without the common peril of creating a precedent, because there are no other Volunteer regiments which can ask the same benefit, all having been included in the act of 1890.

Some of these men I know personally, both of the Eighteenth and the Nineteenth. They are distinctly of the type which developed the prairie West, the West that I knew as a boy. I know of no single man who is not of that strong type even to this day, so far as stature and mentality is concerned. I have met none of them, by the way, who had any considerable complaint. On the contrary, each man in his turn, as he came to me on the subject of having the benefits of the act of 1890 granted to them, has made a plain statement of his service and asked me to help get him the benefits of the act if I could. As Gen. Sheridan and Gen. Custer have testified, and as I know from the survivors I have met, they were a magnificent body of men. They served faithfully, bravely, and well. I would like to see Congress, with this committee taking the initiative, give them what I consider their just dues.

Mr. SMITH. Do you think these organizations should be included in a bill by name, or could they be included in the general provisions?

Mr. MURDOCK. They can be considered as Indian war veterans, of course, but they do occupy a separate and distinct position by reason of the fact that they were regularly mustered into the military service of the United States.

Mr. SMITH. If you mention them as organizations, then you immediately raise the suggestion in the minds of men who have introduced bills to recognize State organizations that participated in the War of the Rebellion.

Mr. MURDOCK. Yes. But these were not State organizations. These were United States volunteers and were not State organizations. They occupy an entirely different legal status for that reason. I would like to impress upon you again the fact that they are the only two volunteer regiments which do not enjoy at this writing the benefits of the act of 1890 and the acts which have supplemented it.

Mr. KEATING. Mr. Taggart, we will be glad to hear from you.

STATEMENT OF HON. JOSEPH TAGGART, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF KANSAS.

Mr. TAGGART. Mr. Chairman, I beg leave to supplement what has been said by Mr. Murdock with reference to the Eighteenth and Nineteenth Cavalry. These two organizations served at different times. The Eighteenth Kansas Cavalry was mustered into the service of the United States at the request of the War Department in July, 1867, to serve four months. As stated by Mr. Murdock, they immediately got into action. They were attacked by Asiatic cholera three days after being mustered into the United States service and 20 of them lost their lives by that horrible disease. Scarcely were they a month in the service when they fought a decisive battle with the Indians, which has been referred to and described by my colleague from Kansas. They behaved admirably, served their time, and were honorably discharged from the service in November, 1867.

Mr. SELLS. How long was there actual service?

Mr. TAGGART. Four months, the time for which they were enlisted. It was active service; it was constant marching and fighting. There is a living witness of their service in this city, a man of some note and well known to the members of this House—Maj. Armes, retired, of the United States Army. He would be able to present to the committee many incidents of the peculiar western persistency and courage with which those men performed their duty under most trying circumstances, men who soldiered spontaneously, men who fought the Indian in his own style and beat him at his own game.

The Nineteenth Kansas Cavalry was organized at the suggestion of Gen. Sheridan. It consisted of the regular 12 companies of a cavalry regiment, supposedly full companies of 100 each. With characteristic western impetuosity the men were mustered into service within 10 days after the governor of Kansas had issued a proclamation calling for volunteers. They were mustered regularly into the United States service from the 20th to the 29th day of October, 1868, to serve six months. As stated by Mr. Murdock, they were under the command of Gen. Sheridan and of Gen. Custer, and it goes without saying that whoever served under those two officers did soldiering, and if any regiment was ever praised by Gen. Sheridan it deserved that praise, because he was not given to praise that was not merited.

The winter of 1868-69 was an exceptionally cold and bitter winter. I did not have the singular advantage of seeing the pioneering of Kansas like the distinguished gentleman from Wichita, but that pioneering and that Indian fighting have a classic significance. They could happen but once. It is thought and believed, and I think justly, that there never will be another Indian campaign. The Indian scout and Indian fighter has gone into history. His peculiar character is fixed among the heroes and pioneers of the western

country; his place can never be taken; no one can ever duplicate his work; he stands alone and he is entitled to the consideration of the whole country.

Mr. MURDOCK evidently refers to a report that was made in the Fifty-third Congress, on February 27, 1905, on a bill introduced by Mr. Baker, of Kansas, afterwards Senator, was he not?

Mr. MURDOCK. I think, on the contrary, that my report was on a House bill.

Mr. TAGGART. This was a House bill, on which a favorable report was made, extending the provisions of the act of June 27, 1890, to these organizations, the Eighteenth and Nineteenth Kansas Cavalry, the report recommending that the bill should pass.

In this report the records of the regiment are fully discussed, as quoted from by the Congressman, and I submit these portions of the report that have not been stricken out and which have already been read by the gentleman from Kansas, Mr. Murdock. I also submit a report by The Adjutant General, United States Army, showing the service of these organizations, which I ask to have incorporated in the record, and I wish, carefully, to call the attention of the committee to a statement made by Mr. H. L. Burgess, an eminent attorney of Olathe, Kans., who served faithfully in one of these regiments.

Among other things, Mr. Burgess said:

Under the authority of the War Department, in July, 1867, a volunteer Cavalry battalion of four companies was organized and mustered into the United States service. This organization was designated the "Eighteenth Kansas Volunteer Cavalry." It was mustered in on the 15th day of July and immediately took the field. This organization consisted of 358 officers and enlisted men and was commanded by Maj. Horace L. Moore, of Lawrence, late lieutenant colonel of the Fourth Arkansas Volunteer Cavalry—and, I will remark right here, a Member of this House in the Fifty-third Congress.

Mr. Burgess continued:

The regiment served four months and met the Indian marauders in several sharp engagements, which always resulted to the disadvantage of the hostiles. A number of men were killed and wounded in the battalion, the loss in casualties being about 10 per cent. The battalion was mustered out on the 15th day of November, 1867, having always received the commendation of the regular officers under whose observation they served for bravery and efficiency.

With reference to the Nineteenth Kansas Volunteer Cavalry, Mr. Burgess says this:

In October, 1867, Gen. Sheridan, whose energetic presentation of the matter seems to have awakened the officials of the War Department, received instructions from the Secretary of War to raise a regiment of Kansas volunteer troops for six months' service. On October 9 he made his request to Gov. Crawford. On October 10 the governor issued his proclamation, and 10 days later the Nineteenth Kansas Volunteer Cavalry was mustered into the service of the United States. Gov. Crawford resigned, and took command of the regiment in person. The regiment served under Gen. Sheridan while he conducted the energetic campaign of the winter of 1868 and 1869. No severe fighting resulted, but the Indians were given no rest. The winter was severe. Violent storms were frequent and the snow deep, and the hardships endured by the troops were terrible. The Nineteenth Kansas was mustered out at Fort Hays on the 18th day of April, 1869.

I am not here, and I take it my colleague (Mr. Murdock) is not here, to insist simply that these two organizations should be pensioned in contradistinction to other men who rendered equivalent service. I would ask, however, that the committee name these two organizations for the convenience of the department. They are deserving of a name in a bill of this kind. It takes nothing from the

bill; perhaps it adds nothing to the bill, and yet it would give definiteness to it, because their service is so much a matter of record that it would add to the convenience of the department in dealing with the matter, and leave no doubt as to the intention of Congress with respect to these two very efficient organizations.

The only sentimental thing I wish to say here is that, as one who has tried to do much for the men who served the flag in the terrible War between the States, it would do my heart good to have a share in remembering these men, who were then boys, and who took part with their neighbors in the Confederate Army and who afterwards went shoulder to shoulder with the men of Kansas who had served in the Union Army, and slept under the same blanket in that terrible winter, in both the Eighteenth and Nineteenth Kansas Cavalry, with their former adversaries in the field. I know that this sentiment would be shared by the good people of Kansas. It is the only opportunity that you would have, gentlemen, that I know of, to remember those Confederate soldiers officially.

But one-fifth of the Union Army remains after 50 years. Practically 50 years have passed away, and but one-fifth of the Indian fighters of 50 years ago, I would say, now remain. It is to be remembered that a great share of these men, as was stated by the chairman in the beginning, I think, had served in the Union Army in the War of the Rebellion. Those that took part in the Federal Army would, of course, not be entitled to pensions, and would, perhaps, receive a better pension under the present law than they would receive under this proposed law. I have not come to ask that you pass this bill exclusively for the benefit of the Eighteenth and Nineteenth Kansas Cavalry, but to present their record and ask that they be included in any bill that you do pass, and that they be included by name. I would further say that in my reading of the bills here I notice how difficult it is to state definitely just whom you wish to reach with it and to so describe a man who had taken part in one of these Indian campaigns as to make it certain that he can be definitely identified by the Pension Bureau. Let me suggest that in drawing the bill you keep in mind the men who were not enlisted in any organization, but who perhaps did as hard fighting and as hard marching as any man whom we had that served in these Indian campaigns. I have in mind a man in my town who went all through an Indian campaign. He was an expert teamster; he was an expert in loading pack mules; he was an all-around handy man. He was shot at and wounded in action. He was in every fight they had. He fought like everybody else when there was a fight, and when the fight was over he was more useful than anyone else. That man deserves as much consideration, and even more consideration, than the fellow who was regularly enlisted. He did voluntarily what the other fellow had to do. He was able to do more than the other fellow could after the battle was over.

Mr. SELLS. I would like to ask the gentleman how the Pension Bureau would ever locate those men who were not mustered in the service?

Mr. TAGGART. In Mr. Rucker's bill he comes as near to it as it can possibly be done. He spoke of anyone who had been paid for his service. Most of the States paid men who went in militia companies. They identified them in some way. They could prove they were

there and took part. I think this bill mentions specifically those who took part and were paid, in the proviso which says that "Where there is no record of enlistment or muster into the service of the United States in any of the wars mentioned in this act, the record of pay by the United States shall be accepted as full and satisfactory proof of such enlistment and service."

Mr. SELLS. By the United States, it says?

Mr. TAGGART. Yes.

Mr. SELLS. Many of them, however, were not paid by the United States?

Mr. TAGGART. I take it—and I presume the experience of these gentlemen who live farther west is the same, judging from my conversations with them—that many of them never got anything at all for their service. The people fed them, or they helped themselves, but they lived in some way while they went out and conducted these campaigns. I would say, in drawing the bill, that any officer, enlisted man, or any man who served in any war or campaign for three months or more or who, having served less than three months, was disabled by reason of wounds or disease contracted in such service should be eligible to the benefits of this act; and you might add to it, by way of description, that if satisfactory proof were furnished that he had actually served in such a campaign or Indian war for three months or more, or had sustained wounds or disease as in the other case, he would be held and considered as having been an enlisted man in such war or Indian campaign. Perhaps that is awkwardly stated, but the idea, I think, I have made as clear as might be under the circumstances.

I beg leave to hand these documents to the reporter, with the request that they be printed.

The CHAIRMAN. They will be inserted in the record.

(The documents referred to appear at the close of Mr. Taggart's remarks.)

Mr. TAGGART. Let me say in conclusion that although a few thousand names might be added to the pension roll, it will not in fact add to the pension roll. The roll call on another shore is diminishing the pension roll of the United States faster than any bill that you will pass will add to it.

I wish to thank the committee.

(The documents submitted by Mr. Taggart are as follows:)

STATEMENT OF FACTS RELATING TO THE ORGANIZATION AND SERVICE OF THE EIGHTEENTH AND NINETEENTH KANSAS VOLUNTEER CAVALRY.

Under the authority of the War Department, in July 1867, a volunteer cavalry battalion of four companies was organized and mustered into the United States service. This organization was designated the Eighteenth Kansas Volunteer Cavalry. It was mustered in on the 15th day of July and immediately took the field. This organization consisted of 358 officers and enlisted men, and was commanded by Maj. Horace L. Moore, of Lawrence, late lieutenant colonel of the Fourth Arkansas Volunteer Cavalry. The regiment served four months and met the Indian marauders in several sharp engagements, which always resulted to the disadvantage of the hostiles. A number of men were killed and wounded in the battalion, the loss in casualties being about 10 per cent. The battalion was mustered out on the 15th day of November, 1867, having always received the commendation of the Regular officers, under whose observation they served, for bravery and efficiency.

The above is quoted from page 213 of the Thirteenth Biennial Report of the Adjutant General of Kansas, by S. M. Fox, Adjutant General.

NINETEENTH KANSAS VOLUNTEER CAVALRY.

In October, 1868, Gen. Sheridan, whose energetic presentation of the matter seems to have awakened the officials at the War Department, received instructions from the Secretary of War to raise a regiment of Kansas volunteer troops for six months' service. On October 9 he made his request to Gov. Crawford; on October 10 the governor issued his proclamation and 10 days later the Nineteenth Kansas Volunteer Cavalry was mustered into the service of the United States. Gov. Crawford resigned and took the command of the regiment in person. The regiment served under Gen. Sheridan while he conducted the energetic campaign of the winter of 1868 and 1869. No severe fighting resulted, but the Indians were given no rest. The winter was severe; violent storms were frequent and the snow deep, and the hardships endured by the troops were terrible. The Nineteenth Kansas was mustered out at Fort Hays on the 18th day of April, 1869. (Quoted from p. 227, Thirteenth Biennial Report Adjutant General of Kansas, S. M. Fox.)

From the foregoing quotations it will be seen that these two regiments were composed of about 1,558 officers and enlisted men. They were mustered into the United States service, served the full period of their enlistment, which was more than the minimum term required to entitle any United States soldier to a pension if honorably discharged. Both regiments were armed and equipped, clothed, and fed by the United States Government.

It has been more than 46 years since the Eighteenth was mustered out of the United States service and about 45 years since the Nineteenth was mustered out. Over 50 per cent of the members of these two regiments had served in other regiments during the Civil War and would be entitled to pensions, under existing laws, for many years.

For the best estimate that can be made I have consulted with the adjutant general of the State of Kansas and the surviving officers and members of the two regiments. A conservative estimate of the survivors of the two regiments is about 40 per cent, which would leave about 600 survivors of the two regiments, more than one-half of whom are now drawing pensions under existing acts, which would leave about 200, and possibly 250 survivors, who have never been provided for and whose services have never been acknowledged in any way since their discharge.

The surviving widows of those who are deceased, and who are not now drawing pensions, would not probably exceed 100.

Possibly 10 per cent of those who served in the two regiments had served in the Confederate Army prior to their enlistment and service in these two regiments. They served their country as faithfully and as honorably in this service as any veteran of the Civil War.

The Eighteenth Kansas Cavalry was attacked by Asiatic cholera within three days after it was mustered into the United States service, and lost more men from that terrible epidemic than it lost in action.

It was engaged in a most active campaign during the entire term of enlistment and served with regular troops, mostly with the Seventh and Tenth United States Cavalry regiments.

The following is quoted from footnote 1, page 443, Kansas Historical Collections, volume 9:

NOTE 1.—*Eighteenth Kansas Volunteer Battalion*.—During the month of July a battalion of four companies was organized, by authority from Lieut. Gen. Sherman, to protect the western settlements, to guard the employees of the Union Pacific Railway, eastern division, and the travel on the great highways leading to the West and Southwest. The battalion was commanded by Maj. H. L. Moore, of Lawrence, formerly lieutenant colonel Fourth Arkansas Cavalry; Company A by Capt. Henry C. Lindsey, of Topeka, with Lieuts. Thomas Huges and John Wellman; Company B by Capt. Edgar A. Barker, with Lieuts. John W. Price and Samuel Hybarger (succeeded by Francis M. Stahl); Company C by Capt. Geo. B. Jenness, with Lieuts. Peleg Thomas and James Reynolds; Company D by Capt. David L. Payne, with Lieuts. John M. Cain and Henry Hegwer. The battalion consisted of 358 officers and enlisted men. They were organized for a period of four months. They discharged their duties faithfully and received the commendation of the officers of the Regular Army as good and faithful soldiers. About 10 per cent of their number fell during their short term of service. The expenses incurred in the organization of this battalion, and not paid by the United States Government, will be found in the accompanying report of Col. Haskell, quartermaster general of the State. (Adjutant General's report, 1867, p. 6.)

NOTE 2.—The rolls of the Eighteenth Kansas Volunteer Cavalry are printed, together with those of the Third, Fourth, and Nineteenth Kansas Volunteer Regiments, in the thirteenth biennial report of the Adjutant General. This portion of the report has also been repaged and bound separately.

Also on pages 443, to and including page 452, is an account of the fight with Indians in which a part of the Eighteenth Kansas Cavalry was engaged, together with regular troops, under the command of Maj. Armes of the Regular Army, in which action the volunteer troops under command of Capt. George B. Jenness, of Company C, displayed great bravery and suffered a severe loss in both killed and wounded.

Also footnote No. 5, Kansas Historical Collections, volume 9, contains a report of Capt. H. C. Corbin, of the Thirty-eighth United States Infantry, commanding post New Fort Hays, dated August 4, 1867, giving a report of the battle of Beaver Creek and the part taken in it by the Eighteenth Kansas Cavalry.

Also a very interesting account of the service of the Nineteenth Kansas Cavalry, by James Albert Hadley, written for the Kansas State Historical Society, may be found commencing on page 428, to and including page 456, Kansas Historical Collections, volume 10.

This article gives a detailed account of the services of the regiment in a winter's campaign with the Seventh Cavalry under Gen. George A. Custer, in which campaign Mrs. Morgan and Miss White, who had been captured by the Indians, were rescued and returned to their people by the Government.

[House Report No. 1945, Fifty-third Congress, third session.]

The Committee on Pensions, to whom was referred the bill (H. R. 8631) extending the provisions of an act granting pensions to soldiers and sailors, approved June 27, 1890, to the Eighteenth and Nineteenth Regiments of Kansas Cavalry Volunteers, have considered the same and respectfully report as follows:

A report from the officer in charge of the Record and Pension Office, War Department, shows that a battalion of the Eighteenth Kansas Cavalry Volunteers organized under a circular of June 21, 1867, from headquarters Military Division of Missouri, was mustered into the military service of the United States from July 13 to 15, 1867, at Fort Harker, Kans., to serve for a period of four months, and that it was mustered out of service at the same place November 15, 1867.

It also appears from the records that the Nineteenth Regiment Kansas Cavalry Volunteers organized under authority contained in a telegram from the Secretary of War to Lieut. Gen. Sherman dated October 6, 1868, was mustered into the United States service by companies from October 20 to 29, 1868, at Topeka, Kans., to serve for a period of six months, and that the regiment was mustered out of service April 18, 1869, at Fort Hays, Kans.

The official report shows that these organizations were called out to aid in the suppression of Indian hostilities, and the records further show that the battalion of the Eighteenth Kansas Cavalry, above referred to, and the Nineteenth Regiment of Kansas Cavalry are the only two volunteer organizations mustered into the military service of the United States since the War of the Rebellion.

At the time the Eighteenth Kansas was mustered in at Fort Harker a severe epidemic of cholera prevailed at that place, and it is shown by the records of the War Department that 20 deaths occurred in the battalion from that disease.

On the 21st and 22d of August, 1867, Companies B and C of this battalion were in an engagement with the Cheyenne Indians on Prairie Dog Creek in Kansas, with a loss of 14 officers and men killed and wounded, and Maj. Armes, of the Tenth United States Cavalry, commends in the highest terms the officers and men of the Eighteenth who took part in this engagement in saving the State of Kansas from further depredations from the Indians.

In his report the governor of Kansas says:

"On the 30th of August Maj. Moore, with the Eighteenth Kansas, struck a portion of the Indians who had engaged Maj. Armes on the 21st and 22d, and after an engagement of several hours gained a decisive victory. About the same time Maj. Elliott, with a detachment of the Seventh United States Cavalry, attacked another band and drove them in a westerly direction toward the headwaters of the Republican. After these several engagements the Indians retired to their winter haunts and left the frontier settlements of Kansas comparatively at peace."

In Gen. Sheridan's report, dated Chicago, Ill., November 1, 1869, speaking of the depredations of the Indians on the plains during the previous summer and winter, he says:

"So boldly had this system of murder and robbery been carried on, that not less than 800 people had been murdered since June, 1862—men, women, and children."

It had been the custom of the Indians to raid the frontier settlements during the summer, and then seek security by retiring into the mountains during the winter. Gen. Sheridan continues:

"To disabuse the minds of the savages of their confident security, and to strike them at the period when they were the most, if not entirely helpless, became a necessity,

and the general in chief then in command of this division authorized a winter campaign."

The Nineteenth Kansas Cavalry was mustered into the United States service in the last days of October for the purpose of prosecuting the campaign at this season of the year. On the 5th of November the regiment moved from Topeka, Kans., and crossing the Arkansas River at Wichita, moved in a southwest direction to join the Seventh United States Cavalry, near the junction of Beaver Creek with the North Canadian, 112 miles south of Fort Dodge, at a cantonment called Camp Supply.

On the march the command was caught in a severe snowstorm, and, becoming entangled in the canyons of the Cimarron, did not reach Camp Supply until the 30th of November. Of this incident in the history of the regiment Gen. Sheridan says:

"The regiment lost its way, and, becoming entangled up in the canyons of the Cimarron and in the deep snow, it could not make its way out and was in a bad fix. * * * It had been subsisting on buffalo for eight or nine days. * * * Officers and men behaved admirably in the trying condition in which they were placed, but the poor horses suffered greatly, and a number of them were lost."

Of the march down the Washita Gen. Sheridan says:

"The snow was still on the ground and the weather very cold, but the officers and men were very cheerful, although the men had only shelter tents. We moved due south until we struck the Washita, near Custer's fight of November 27, having crossed the main Canadian, with the thermometer about 18° below zero. On the next day we started down the Washita, following the Indian trail; but finding so many deep ravines and canyons I thought we would move out on the divide, but a blinding snowstorm coming on, and fearing to get lost with a large command and trains of wagons on a treeless prairie without water, we were forced back to the banks of the Washita, where we at least could get wood and water. * * *

"This was continued until the evening of the 16th of December, when we came to the vicinity of the Indians, principally Kiowas. They did not dream that any soldiers could operate in such cold and inclement weather, and we marched down on them before they knew of our presence in the country."

The result of this campaign was that Santanta and Lone Wolf, chiefs of the Kiowas, were taken prisoners, and by a threat of execution that tribe was forced to report at Fort Cobb, together with the Comanches and Apaches, and finally induced to go on their reservation.

From Fort Cobb the command marched to the base of the Washita Mountains and established Fort Sill, near Medicine Bluff. On the 2d of March following the Nineteenth Kansas Cavalry and the Seventh United States Cavalry, under the command of Gen. Custer, went in pursuit of the Cheyennes. The course pursued was via Camp Radiminaki, mouth of Elk Creek, to a point on North Fork of Red River, a few miles above the mouth of Salt Fork.

The Cheyenne trail was struck on Salt Fork on the 6th of March, 1869, and followed to the north along the eastern edge of the Llano Estacado until the 20th of March, when the Cheyennes were caught camped on Sweetwater Creek, about 10 miles west of the eastern line of Texas. This march was made practically without transportation or adequate supplies, and for the last few days the men subsisted on mule meat without bread or salt—

In Gen. Custer's official report of this campaign he uses the following language:

"The point at which we found the Cheyenne village was in Texas, on the Sweetwater, about 10 miles west of the State line. Before closing my report I desire to call the attention of the major-general commanding to the unvarying good conduct of this command since it undertook the march. We started with all the rations and forage that could be obtained, neither sufficient for the time for which we have already been out. First it became necessary to reduce the amount of rations; afterwards a still greater reduction was necessary, and to-night most of my men made their suppers from the flesh of mules that have died on the march to-day from starvation. When called upon to move in light marching order, they abandoned tents and blankets without a murmur, although much of the march has been made during the severest winter weather I have experienced in this latitude.

"The horses and mules of this command have subsisted day after day upon nothing but green cottonwood bark. During all these privations the officers and men maintained a most cheerful spirit, and I know not which I admire most, their gallantry in battle or the patient, but unwavering, perseverance and energy with which they have withstood the many disagreeable ordeals of this campaign.

"As the term of service of the Nineteenth Kansas Cavalry is approaching its termination, and I may not again have the satisfaction of commanding them during active operations, I desire to commend them—officers and men—to the favorable notice of the commanding general. Serving on foot, they have marched in a manner

and at a rate that would put some of the regular regiments of infantry to the blush. Instead of crying out for empty wagons to transport them, each morning every man marched with his troop, and—what might be taken as an example by some of the line officers of the regular infantry—company officers marched regularly on foot at the head of their respective companies; and now, when approaching the termination of a march of over 300 miles, on greatly deficient rations, I have yet to see the first straggler.

"In obtaining the release of the captive white women, and that, too, without ransom or the loss of a single man, the men of my command, and particularly those of the Nineteenth Kansas, who were called into service owing to the murders and depredations of which the capture of these women formed a part, feel more fully repaid for the hardships they have endured than if they had survived an overwhelming victory over the Indians."

Your committee is further advised by Hon. H. L. Moore, Member of [the Fifty-third] Congress, who was the major commanding the Eighteenth Kansas during the whole term of its service, that this battalion, as well as the Nineteenth Kansas, was composed largely of men whose homes had been devastated and families murdered by the Indians during their raids on the frontier settlements. The Eighteenth suffered a loss of some 10 per cent from cholera and the casualties of battle. Its service was constant and arduous during the whole term of its enlistment.

The Nineteenth Kansas, of which Mr. Moore was lieutenant colonel, and which he commanded during the latter half of its term of service, prosecuted this campaign during the most inclement weather, and, as the official report shows, much of the time without adequate food or camp equipage. The result of the campaign was to clear the plains of the Indians of the Southwest by forcing them onto their reservations, where they have remained ever since.

Upon full and careful consideration of this bill your committee are unanimously agreed that it is one of exceptional merit. The service rendered by these two organizations was of a very exceptional character, and the results of the same have been widespread and beneficent.

No dangerous precedent will be established by the enactment of this bill into law, as it will be remembered these are the only volunteer organizations which have been mustered into the United States service since the Civil War.

The bill is therefore returned with the recommendation that it do pass.

WAR DEPARTMENT,
THE ADJUTANT GENERAL'S OFFICE,
Washington, January 26, 1912.

HON. JOSEPH TAGGART,
House of Representatives.

DEAR SIR: The official records show that a battalion of the Eighteenth Kansas Cavalry Volunteers, consisting of the field and staff and Companies A, B, C, and D, was mustered into the United States service on July 13 and 15, 1867, at Fort Harker, Kans., to serve four months, and was mustered out of service on November 15, 1867, at the same place.

The Nineteenth Regiment of Kansas Cavalry Volunteers, consisting of the field and staff and 12 companies, was mustered into the United States service by companies, from October 20 to October 29, 1868, at Topeka, Kans., to serve six months, and was mustered out of service April 18, 1869, at Fort Hays, Kans.

Very respectfully,

F. C. AINSWORTH,
The Adjutant General.

STATEMENT OF HON. WILLIS C. HAWLEY, A MEMBER OF CONGRESS FROM OREGON.

Mr. HAWLEY. Mr. Chairman and gentlemen of the subcommittee, I wish to present for your consideration, in supplementary confirmation of what has already been stated, some remarks in support of legislation of this character.

I had the fortune of being born in the West. My mother went across the plains in 1847, and my father in 1848, and I was born in 1864. I knew and know intimately a number of the men who served in the Indian wars in the Northwest. At that early period, and until

within a comparatively recent period, we were isolated from the rest of the world. There were two ranges of mountains to cross and two great deserts to go through in order to reach the Pacific coast—the Rockies and the Cascades, and what used to be called the Great American Desert, and the plains lying between the Rockies and the Cascades. The people out there were compelled to serve themselves. They could not apply to the Government for aid, because by the time the Government could have received word of their distress, they would have either been destroyed, or saved by their own endeavor. Men not only protected their own families, but their services were at the disposal of any people who were threatened with Indian hostilities. For instance, wagon trains coming across the plains would find themselves hemmed in by Indians; their ammunition would be running low. They would dispatch, on the best horses they had, their younger, lighter, best riders in several directions toward known settlements. Some of them would be killed in trying to make their escape through the Indian lines. Some would reach a settlement. Immediately those settlers would take their guns, their horses, their feed, their blankets, gather together a little body, and then gradually assemble in a larger body, and go to the help of that wagon train or to the help of the United States mails. The records of the War Department will show that in the period of the Civil War and afterwards, the Department of War and President Lincoln and the succeeding President asked the people of Oregon—for at that time Oregon and Washington were the old Oregon Territory—to aid the Government in the protection of settlers and wagon trains and the United States mails.

These men were not able at all times to be enlisted in the service of the United States. They would travel many days, suffer many hardships, run the risks that were incident to Indian warfare, do the work of dispersing the Indians, and bring the trains in safely. Those who have never lived in an Indian country do not know the terror of the Indian warfare; not that the men were afraid to fight the Indians, although torture was probably the inevitable result of capture; but the things they dreaded most and that struck a cold chill into their hearts were the things that would happen to the women and children, for it was rather a point of honor or dishonor among many of the Indians in that section—not all of them, but those who caused most of the disturbances—that if a settlement or wagon train or in any body of people who were captured the women and girls should always be abused, and many of them would die under that defilement. For that reason men, as all these western men were, loyal to womanhood would render what service they could.

I have presented a bill in general terms, No. 11512, which I would like to have printed in the record in connection with my remarks.

The CHAIRMAN. That may be done.

(The bill referred to, H. R. 11512, introduced by Mr. Hawley, appears at the close of Mr. Hawley's remarks.)

Mr. HAWLEY. In Mr. Taylor's bill, which is a very excellent measure as far as it goes toward the relief of the men who fought in these wars, two wars are mentioned in which soldiers in Oregon were engaged, the Modoc and the Bannock; but there were other wars in which men did just as good service, just as useful service, which are not mentioned in this measure.

The first section of my bill proposes that there shall be a general law pensioning all Indian war veterans of the Indian wars of the United States prior to the 1st day of January, 1892, which I think is after the date of any war in any part of the United States, including even those that occurred in the great Northwest—Minnesota, Wisconsin, the Dakotas—as well as in the plains of the Southwest, and that their pensionable status shall be \$20 per month, which is the amount to which other Indian warfare veterans that were on the pension roll have been raised.

The CHAIRMAN. Is not that amount, \$20 a month, more than the Civil War veterans receive? Is not the regular pension of the Civil War veterans \$12 a month?

Mr. HAWLEY. Not under the new law?

Mr. SELLS. No; not under the new law.

Mr. HAWLEY. I put this \$20 a month in here for the reason that some time ago, under the act of February 3, 1913, all Indian war veterans were placed upon the basis of a pension of \$20 a month. It will be a flat rate of \$20 a month. It will probably be a fair rate for them.

Of course the record of enlistment in the service of the United States would be adequate proof, but I provide further in my bill that in the absence of such record the record of muster in and pay by the United States shall be evidence of service, and further—for in many instances these men were called out by the States, at the request of the National Government, to take care of their people, especially in the period immediately after the Civil War in that far western country, where we could not get into touch with the Government readily—that in the event there is no record of muster in or pay from the United States Government the records of the States found in the Adjutant Generals' offices of the several States, showing service and pay, shall be adequate.

But even that will not include all the deserving men, and I have provided further that the Secretary of the Interior may, by proper regulation, determine what shall be necessary proof on the part of those who volunteered for service, who did good service, who can prove that service in a satisfactory way, and that they, too, shall be placed on the rolls.

I have placed the length of service at 30 days. The service in Mr. Taylor's bill is 90 days. The length of service in the pension act for Mexican War veterans is 60 days. I can not see that this service should be placed longer than the service of the Mexican War veterans, and it seems to me, under the circumstances and the fact that these men rendered voluntary service, but very useful service, that a regulation of 30 days would be a fair regulation.

There is, in the concluding section, a provision for the pensioning of widows, following the widows' pension act already on the statute books.

I know some of these men who served in the war; for instance, in the Modoc War, Capt. Aplegate, who commanded the troops. The situation in that war may be interesting. These Modocs were a very warlike tribe, as many of the western Indians were. They lived in the country where by warfare with each other they had learned the arts of their primitive warfare very effectively. They were shrewd, they were cautious, they struck suddenly and went quickly away. Following them was dangerous, because they laid

ambuscades and, as I said before, torture was inflicted on captured prisoners. These Indians in the Modoc War went into the lava beds. These lava beds are great masses of rock, irregular in character, having hidden and secret trails, and caverns connecting one place with another, and large bodies of Indians could be secreted absolutely out of sight, and the troops, trying to approach them, would approach apparently an open space, and when they appeared upon the horizon, the Indians, from these caverns or potholes in the rocks or blowholes in the lava, could fire at them with perfect safety, and many lost their lives in this way. War existed there for some period of time.

In southern Oregon, for instance, on the Rogue River and on the Umpqua River, through which wagon trains came over the old Oregon-California trail, running along the boundary between Oregon and California, the Indians would watch until the wagon trains were on the river and were ferrying their stock and wagons across. The plan was usually to take the stock and women over first. The men stayed back to guard those who were on the side from which they were departing, some few having gone on ahead. The Indians would suddenly strike at the women and children, swooping down, seizing what they could, and carrying them away. If the men were watchful, they might check them. Then the wagon train would be divided and under the fire of the Indians. They would apply to the settlers, sending out couriers for aid, and for many miles around these men volunteered, furnished their own equipment, their own powder and bullets, their own guns, their own blankets, their own horses, and their own feed, and came there to either succeed or die in the relief of those people.

In addition to the arguments that have been made in behalf of those who were regularly enlisted in the United States service and for those who were regularly enlisted in the State service, I want to make a plea for those who rendered volunteer service, who can prove their services, that they, too, are worthy of recognition. It was not a regular warfare; it was an irregular warfare. I have no criticism to make or suggestions to offer relative to the way they have of establishing the service in the Civil War, in the Mexican War, in the Spanish War, or in any other wars in which soldiers have been pensioned by the United States. But when you depart from a regular warfare, and especially in a far distant portion of the domain where men rendered not only service to themselves—for they simply protected themselves, and that is what they were expected to do when they went there—and they protected not only wagon trains at the request of the Government, but the United States mails and property, and sometimes, as in the wars in eastern Oregon, they went to the relief of the Government soldiers and equipment.

It should not be regarded as a precedent. These men should be recognized in the pension laws in a way that will recognize the irregularity and the suddenness of the service which they were called to render.

I know many of these men, and I do not know any who are well-to-do in this world's goods. That may have been their fault; it may have been their misfortune. That I can not say. They are not men who have property or wealth, who are asking for this relief which they

believe they deserve and which I believe they deserve, but they are among those who are most deserving by the lack of this world's goods.

I would like to ask permission, Mr. Chairman, to extend my remarks by inserting a little later in the record some documents which I do not have in my possession at this time.

The CHAIRMAN. There is no objection to that, Mr. Hawley; you may do that.

Mr. SELLS. Mr. Hawley, have you ever made any calculation as to the number of men who would be affected by your bill? Are there any data we could get on which to base an estimate?

Mr. HAWLEY. Men with whom I talked, as with Capt. O. C. Applegate, who had command of the troops in the Modoc War, and who lives at Klamath Falls, Oreg., and Capt. Cyrus H. Walker, of Albany, Oreg., who is at the head of the Indian War Veterans Association in that section, thought that a bill of this character would not very greatly enlarge the number that would be benefited over what would be benefited by Mr. Taylor's bill. It would recognize some very deserving cases, probably a few hundred. But at that time life was hard and the burdens were great in that new country, and the mortality has been great among them. It is more a matter of desert than of the number of men that causes me to appeal for this particular portion of the Indian fighters; but I doubt, if this bill will pass as I have drawn it and all were benefited who could or who would apply for the benefits of it, if over 4,000 altogether would be placed on the rolls. I very much doubt if 4,000 would go on the rolls, from the information I have been able to collect. It is not a very large number that would be put on the rolls. It is not for the reason that a very large number would be benefited that you are called upon to pass this legislation; it is because of the danger and hardship of service and the value of the service they rendered to a new and practically defenseless country.

Mr. SELLS. I understand that a great number of these men saw service of less than 90 days.

Mr. HAWLEY. Oh, yes. A great many saw less than 90 days. I place the limit at 30 days. A great many who did good service served less than 30 days, but you will have to fix a limit somewhere as to days of service.

I desire to thank the committee for this opportunity.

The CHAIRMAN. We are glad to hear from you, Mr. Hawley.

[H. R. 11512, Sixty-third Congress, second session.]

A BILL To provide pensions for the officers and soldiers of the Indian wars of the United States which occurred prior to January first, eighteen hundred and ninety-two.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior be, and he is hereby, authorized and directed to place on the pension roll the names of the officers and soldiers of the Indian wars of the United States which occurred prior to January first, eighteen hundred and ninety-two, at the rate of \$20 per month, upon making proof of the fact of such service, according to such rules and regulations as the Secretary of the Interior may provide.

SEC. 2. That where there is no record of enlistment or muster into the service of the United States in any of the wars covered by the provisions of this Act the record of pay by the United States or the record of such service, enlistment, or muster in the War Department of the United States or on file in the office of any adjutant general of any of the States or Territories shall be accepted as complete and satisfactory proof of such enlistment and service; and further, where there is no record of enlistment or muster into the service of the United States or in the office of the adjutant

general of any State or Territory where the service was performed, then other adequate proof may be made of the performance of such service: *Provided*, That each such officer or soldier shall have served at least thirty days in such Indian wars: *Provided further*, That nothing in this Act shall be so construed as to effect a reduction in the amount of pension now received by any such officer or soldier.

SEC. 3. That the provisions of an Act approved April nineteenth, nineteen hundred and eight, entitled "An Act to increase the pension of widows, minor children, and so forth, of deceased soldiers and sailors of the late Civil War, the War with Mexico, the various Indian wars, and so forth, and to grant a pension to certain widows of the deceased soldiers and sailors of the late Civil War," shall be held to include the widows, minor children under sixteen years of age, and helpless minors as defined by existing laws, of the officers and soldiers of the wars covered by this Act.

STATEMENT OF HON. ADDISON T. SMITH, MEMBER OF CONGRESS FROM IDAHO.

The CHAIRMAN. Mr. Smith, the committee will be very glad to hear from you now.

Mr. SMITH. Mr. Chairman and gentlemen of the Committee, with your permission I will defer to my colleague, Mr. French, as he has a bill pending and has given the matter full consideration.

STATEMENT OF HON. BURTON L. FRENCH, MEMBER OF CONGRESS FROM IDAHO.

The CHAIRMAN. Mr. French, you may proceed, if you desire to do so at this time.

Mr. FRENCH. Mr. Chairman and gentlemen of the committee, a good deal that I might say on this general proposition has been covered by the other Members who have addressed the committee, and so I shall omit to repeat much that might be said.

The bill I introduced is No. 1910. In a general way it provides for extending to the surviving officers and enlisted men, or their widows, who served in the Indian wars of the western frontiers of the several States and Territories the provisions of the pension acts of June 27, 1890, and February 6, 1907.

I think the bill of the gentleman from Oregon (Mr. Hawley) is a bill calculated to reach the end that I have in mind. I am also very much pleased with the bill of the gentleman from Colorado (Mr. Taylor), No. 1672. I would say in connection with the bill of Mr. Taylor, No. 1672, that the bill omits the volunteers in the Nez Perce Indian War, I think inadvertently. It seems to be based upon the bill that was reported from the committee favorably by Mr. Rucker, of Colorado, and if you will notice in the report on that bill, the report of The Adjutant General, under date of January 13, 1912, there is included and enumerated the different war veterans who would be recognized, including the Nez Perce War or the veterans of the Nez Perce War of 1877. If you shall follow the Taylor bill, of course I would ask that it be amended so as to include the Nez Perce War volunteers, which I assume was intended, and that the name was omitted inadvertently.

Another thought in this connection has occurred to me. Mr. Taylor may have noticed there was a Nez Perce Indian War pension bill.

The CHAIRMAN. I might say, in that connection, that Mr. Taylor merely introduced the Rucker bill. Judge Rucker, of Colorado, intro-

duced the bill in the last Congress, and as he did not come back to this Congress Mr. Taylor reintroduced that bill.

Mr. FRENCH. I assume that the language referring to the Nez Perce Indians was omitted inadvertently, or else upon the theory that the Nez Perce Indian pension bill that was passed about 1881 applied to all these Nez Perce Indian veterans; but the fact of the matter is that that only applied to those in Montana and possibly the Dakotas, as I understand it.

Mr. SMITH. It applied only to those who were injured through service or who incurred sickness in the service.

Mr. FRENCH. Only to those in Montana, as I understand it.

Mr. SMITH. I am not sure about that.

Mr. FRENCH. Idaho at that time was a Territory and that law, if I recall, omits it. At any rate, the point I had in mind was to suggest that when the bill shall be prepared definitely, the Nez Perce Indian War veterans shall be definitely included.

I could cite a good many instances of warfare between the settlers in Idaho and the Indians that would challenge the admiration of the committee and of the Congress. I could go into the southwestern corner of my State, into Owyhee County, which adjoins the State of Oregon, where at one time, without the calling upon the Federal authorities, something like three companies were organized in the neighborhood of Boise and lawless bands of Indians were required to comply with the ordinary conditions which civilization commands, something like 50 years ago.

I could cite the instance where citizens of the State of Utah went into one of the counties of my State and established a settlement in the beautiful Lemhi Valley, I think in 1858; how some of their members were massacred by members of the Lemhi Indians; and I could tell you how, without appealing to the Government, the citizens of that State, commanded, I believe, by Col. Cunningham, leading about 100 men, volunteered and went up into the Lemhi country and escorted the members of that little settlement back to their friends and neighbors in Utah, and the settlement was abandoned in the Lemhi country.

I could go on and mention other instances where the citizens of the western communities in my State and neighboring States have, without calling upon the Federal Government, at once met and assumed the responsibility of quieting the Indians or protecting the settlements that had been established.

The only instances, however, that it seems possible that we can recognize are those in which very largely it may be shown that the cooperation of the settlers, as they volunteered, was to supplement the forces of the United States Army. The Nez Perce Indian War occurred in 1877, and I remember as a boy going into that country five years later and that the old barricades were still partially standing in Palouse, Wash., a few miles from the Idaho line, where my home was for several years—an old stockade built of logs, in which the women and children were gathered that they might be protected from the Nez Percés, as they were roaming through that country committing their depredations.

In my home city of Moscow, within a few stones' throws from where my residence is, is the site of the old stockade that was built there. In all these old towns in that section of the country can be

pointed out possibly not the remnants of the old stockades, but at any rate yet remembered by the old pioneers, the places where they stood, and where the women and children were gathered in order that they might be protected.

The Nez Perce Indians, so long as they have been known to the white race, have been of an unusually high type and, generally speaking, friendly to our people.

The Nez Perce Indian War involved only a portion of the tribe, while a great majority of the Nez Percés were friendly, and refused to participate in the warfare. The friendly Indians were located upon the Nez Perce Indian Reservation. Chief Joseph, however, claimed certain lands in the Wallowa Valley in Oregon, and he and his immediate followers refused to sign or to accept the treaty which set apart the Nez Perce Reservation in Idaho as the home of the Nez Perce Indians.

Settlers began to acquire lands in the Wallowa Valley, and these settlements were regarded as marks of hostility by Chief Joseph. United States troops were sent into the valley to help preserve peace between the white settlers and the Indians, and with the hope of persuading the Indians to join their brethren on the Nez Perce Reservation.

While these negotiations were still pending, members of Chief Joseph's band left the Wallowa country along about the 10th or 11th of June, 1877, crossed the Snake River into the State of Idaho, and during the next few days wrought terrific havoc upon the helpless settlements scattered along the Salmon River and extending north into the Camas prairie and cottonwood sections of country. Besides Chief Joseph's band there were small bands under the leadership of three other chiefs, Chief Looking Glass, Chief White Bird, and Chief Tchulhulote. The Indians under each one of these chiefs refused to go upon the Nez Perce Reservation and lived in the valleys of Clear Creek and Salmon and Snake Rivers.

I need not review in detail the history of the depredations committed by the Indians in the raids that were made. Hundreds of horses and cattle were stolen and driven away. Something like 20 citizens were killed, others were wounded and outraged, numerous dwellings and cabins were plundered and burned, barns, shops, and stores likewise were plundered and left in ashes. The whole country was rather in a state of terror, and June 14, 1877, is the day that marked the great crisis in the depredations committed. Gen. Howard was at that time stationed at Fort Lapwai. The entire command that he could assemble within a period of two or three weeks amounted to possibly not much more than an organization of some 400 men, including Infantry and Cavalry, that could be gathered together from the country round about. He was very glad to accept and receive the assistance of volunteers who came forward from Lewiston, from around Idaho City, in Idaho County, from the section of the country across the line in the State of Washington, Dayton, Walla Walla, and, I think, I have a list here of something like 400 names of volunteers who came from the farms and from the towns in that section of the country and who joined in the campaign against the Nez Percés.

The campaign was very short in the State of Idaho. There was considerable skirmishing, and at one time Lieut. Teller and 23

men were killed, and at another time Lieut. Raines and some 10 men were killed, and finally at Cottonwood Creek a rather sharp engagement occurred, in which there was a very large loss of life upon the part of the Indians and they were routed. The Indians comprised something like 300 warriors, something like 200 squaws, and they had something like 1,500 or 1,600 ponies and horses. Immediately after this engagement at Cottonwood Creek the Indians struck Lolo Trail and crossed into the Montana country, and were followed by Howard. I think the next engagement in Montana occurred along in August of the same year, and the campaign continued through the State of Montana, over into the State of North Dakota, and I believe it was in the latter State that the terms of peace were finally concluded and Chief Joseph was captured.

The men engaged, who were volunteers from my section of the country, did not serve 90 days. Some of them did not serve possibly 30 or 60 days. It occurs to me that the measure of that recognition to which they are entitled should be based upon not length of days of service, but rather what they did in maintaining a section of the country that we are proud to-day to regard as one of the choicest sections and one of the most prosperous sections, filled with splendid homes, in the Northwest, and one of the earliest settlements in the Northwest.

It seems to me a little different basis ought to be considered than that of days of service; the fact they actually enlisted, that they went through the hardships that they did go through; and it seems to me, too, there should be taken into consideration the fact that many of these men, through their service, had to travel long distances in order to join and become a part of these companies.

Furthermore, both before and after the crisis of the conflict there existed a period of uncertainty and of tension that drew heavily upon the time and self-sacrificing devotion to their country of the men upon whose shoulders rested the responsibility of cooperating with the soldiers of the United States in maintaining order. Not only were volunteers contributed by the sections of country around the Nez Perces, but they were contributed from still farther south. The Bannock Indians, whose home was in the southeastern part of the State, were not satisfied. Many of the members of their tribe had roamed westward and were not far from Boise, with the probable intention of joining the unruly bands in the north. Volunteers came from Boise, and under the command of Capt. Orlando Robbins played their part in preserving peace. Disquieting reports were received from widely separated sections of country, and it was altogether probable that the vigilance of the volunteers was chiefly responsible for the failure of Bannock bands and Chief Joseph's Band to get together in 1877.

The volunteers who came forward from Boise and the surrounding section of country were furnished with arms and ammunition from the stores of the United States at Boise Barracks. The volunteers in the northern part of the State from around Mount Idaho and Lewiston, and from the Dayton Valley in the State of Washington, probably furnished their own arms and ammunition, though the situation was so critical that the Delegate in Congress from Idaho at that time, Hon. S. S. Fenn, pushed a resolution through the House and Senate authorizing and directing the Secretary of War to order by wire that

United States arms be shipped by steamer from Fort Vancouver on the Columbia River to Lewiston, Idaho, for the use of the citizens. The President signed the resolution immediately and the order was sent.

I believe the loss to the troops under Gen. Howard was 13 killed and 32 wounded in the engagements in Idaho. Among the volunteers there were three killed and two wounded. The Indians sustained a loss of something like 32 killed and between 40 and 50 wounded, of which number, later on, several died, while about 40 of their number were taken prisoners. This is not a time for eulogy, but I can not fail to speak in the highest praise of the bravery, courage, and worth of the officers and men of the volunteer companies for whose service we are asking a slight recognition.

I desire to insert in my remarks data that will show the names of the men who participated in this campaign. These volunteers were under the command of such well-known officers as Capt. O. Robbins, W. B. Bloomer, D. B. Randall, Ed McConville, George Hunter, W. R. Boothe, and A. J. Bowland.

The data furnished by Mr. French for insertion is as follows:

WAR DEPARTMENT,
Washington, March 26, 1890.

SIR: I return herewith Senate bill 87, "For the relief of the citizens of the State of Oregon and the Territories of Idaho and Washington who served with the United States troops in the war against the Nez Perces and Bannock and Shoshone Indians, and for the relief of the heirs of those killed in such service, and for other purposes," which was referred to this department by your indorsement of the 7th instant, and invite your attention to the inclosed reports of the Adjutant General, dated the 22d instant, and of the officer in charge of the Record and Pension Division of this office, submitting the lists of such citizen volunteers from Oregon, Idaho, and Washington who performed military services during the Nez Perce, Bannock, and Shoshone Indian wars of 1877 and 1878.

In view of the many calls upon this department for the information herewith furnished, I recommend that these papers be printed.

Very respectfully,

REDFIELD PROCTOR,
Secretary of War.

Hon. WM. M. STEWART,
Subcommittee of Committee on Military Affairs, U. S. Senate.

Lists of names of Idaho and Washington Territories Volunteers in Nez Perce Indian War of 1877.

M. BRAYMAN,

Governor and Commander in Chief Idaho Volunteers:

I herewith submit my report for Company A, Idaho Volunteers.

BOISE CITY, IDAHO, July 7, 1877.

No.	Rank.	Name.	Days in service.	Number of horses.	Expenses on trip.
1	Captain.....	O. Robbins.....	18	2	From Indian Valley to Boise, \$25.
2	First lieutenant.....	John Halley.....	18	1	
3	Second lieutenant.....	John S. Gray.....	18	1	Horseshoeing, \$5.
1	First sergeant.....	Chas. Himrod.....	18	1	
2	Second sergeant.....	James Stout.....	18	1	Flour, ferrriage, and horse-shoeing, \$4.
4	Third sergeant.....	Elias Downs.....	18	1	
4	Fourth sergeant.....	D. L. Green.....	18	1	
5	Second corporal.....	E. R. Leonard.....	18	1	
6	Third corporal.....	Joseph Joyce.....	18	1	
7	Fourth corporal.....	John Paymton.....	18	1	
8	Private.....	E. B. Gaylord.....	18	1	
9	do.....	Isaac B. Cleek.....	18	1	
10	do.....	Owin Thompson.....	18	1	
11	do.....	John Campbell.....	18	1	
12	do.....	Charles Nelson.....	18	1	
13	do.....	Harry Russell.....	18	1	
14	do.....	E. A. Hollister.....	18	1	
15	do.....	A. Jewell.....	18	1	
16	do.....	H. Mures.....	18	1	
17	do.....	T. S. Beebe.....	18	1	
18	do.....	August Smith.....	18	1	
19	do.....	E. B. Comley.....	18	1	
20	do.....	W. H. Oglesby.....	18	1	
21	do.....	A. Rosse.....	18	1	
22	do.....	B. Frere.....	18	1	
23	do.....	Chas. Green.....	18	1	
24	do.....	Geo. White.....	18	1	
25	do.....	Peter Carney.....	18	1	
26	do.....	M. T. Dowling.....	18	1	
27	do.....	T. E. Logan.....	18	1	
28	do.....	A. P. Turner.....	18	1	
29	do.....	J. M. Munden.....	18	1	
30	do.....	George Bayley.....	18	1	
31	do.....	Thomas B. Smith.....	18	1	
32	do.....	E. W. Boemer.....	18	1	
33	do.....	G. W. Gess.....	18	2	
34	do.....	C. J. Small.....	18	1	
35	do.....	Jo. Rill.....	18	1	
36	do.....	Bryan Farley.....	18	1	
37	do.....	Peter H. Klussman.....	19	1	
38	do.....	Nelson Walling.....	18	1	
39	do.....	L. S. Owens.....	18	1	
40	do.....	J. H. Portlock.....	15	1	
41	do.....	Wm. Hammersley.....	15	1	
		Joseph Perault.....		1	
		John Lemp.....		1	
		Jo. Misseld.....		1	
		J. D. Agnew.....		1	

ORLAND ROBBINS,
Captain Company A, Idaho Volunteers.

OFFICE ASSISTANT QUARTERMASTER,
Boise City, Idaho, July 18, 1877.

A true copy.

G. W. BRADLEY,
Captain and Assistant Quartermaster.

GRANGEVILLE, IDAHO, June 15, 1877.

We, the undersigned, citizens of the United States, residing at Grangeville, Idaho, and vicinity, do hereby individually and collectively agree to enroll ourselves as a body or company of volunteers, under the direction and command of his excellency, M. Brayman, governor of Idaho Territory, and in conformity with his proclamation for that purpose:

- | | | |
|----------------------|----------------------|----------------------|
| 1. A. H. Gordon. | 16. W. C. Pearson. | 31. M. P. Crooks. |
| 2. C. P. Clingan. | 17. W. H. Sebastian. | 32. James Spence. |
| 3. A. Shumway. | 18. J. Brown. | 33. Robert Wilmot. |
| 4. I. T. Silverwood. | 19. J. B. Crooks. | 34. John Flynn. |
| 5. John Johnson. | 20. W. B. Bloomer. | 35. Patk. Cardin. |
| 6. F. M. Hughes. | 21. J. J. Remington. | 36. Frank Weichel. |
| 7. C. M. Redman. | 22. Chas. Bentz. | 37. E. W. Roble. |
| 8. S. Weaver. | 23. Jas. W. Crooks. | 38. John Healy. |
| 9. W. M. Williams. | 24. Saml. Harty. | 39. John Weaver. |
| 10. James Plenne. | 25. S. W. Reynolds. | 40. C. H. Robinson. |
| 11. J. M. Crooks. | 26. Chas. Crooks. | 41. C. H. Brown. |
| 12. John Fields. | 27. E. S. Remington. | 42. Albert Penching. |
| 13. J. H. Ranch. | 28. John Byram. | 43. John Mitchell. |
| 14. G. W. Hashagen. | 29. D. C. Crooks. | |
| 15. V. D. Remington. | 30. Jas. L. Crooks. | |

I hereby certify the foregoing to be a correct list of the officers and men duly enlisted and entered into service as the "Grangeville Volunteers," of which company I am captain.

W. B. BLOOMER,
Captain, Grangeville Volunteers.

GRANGEVILLE, IDAHO, June 15, 1877.

The following officers were unanimously elected at a meeting of the company held June 15, 1877: W. B. Bloomer, captain; W. S. Williams, first lieutenant; C. P. Clingan, orderly sergeant.

MOUNT IDAHO, IDAHO, August, 1877.

I certify that this is a true copy of the original roll of officers and volunteers enrolled at Grangeville, Idaho, June 15, 1877.

JAMES P. CANBY,
Major and Paymaster, United States Army.

Roll of officers, noncommissioned officers, and privates enrolled at Mount Idaho, Idaho, June 15, 1877.

Officers.	Remarks.	Value.
Randall, D. B., captain	1 horse	\$150
Clarley, James, first lieutenant		
Wilmot, L. P., second lieutenant		
McPherson, John, sergeant	Horse, \$150; Henry rifle, \$50	200
Rainey, J. W., sergeant	Horse, bridle, and pistol	150
Oliver, F., sergeant		
Eastman, J. W., sergeant		
Nugent, Robert, corporal		
Smith, George, corporal		
Bower, John, corporal		
Martin, M. S.	Horse, musket, and pistol	100
White, K. W.	Horse and pistol	
Riggins, George		
Auchincloss, Jno		

Privates.

1. Aram, J. T.
2. Aram, John.
3. Adkinson, Jno. K.
4. Adkinson, P. D.
5. Hemelspak, Jos.
6. Barber, J. O.
7. Brown, R. C.
8. Beamer, W. B.
9. Bocher, L.
10. Bartley, A. D.
11. Bunker, T. J.
12. Buchanan, Jas.
13. Clark, W.
14. Crea, John.
15. Crea, Thomas.
16. Chapman, J.
17. Crossdale, H. E.
18. Dalles, Green.
19. Day, C. M.
20. Erskin, C. H.
21. Eastman, J. W.
22. Eaton, C. T.
23. Flynn, Charles.
24. Faxon, H. A. (Horse, pistol, and carbine.)
25. Grottle, William.
26. Hall, George.
27. Harrison, Joseph.
28. Harris, J. C.
29. Hansen, John.
30. Howser, D. H.
31. Jarrett, M. V.
32. Jerome, M. E.
33. King, Peter.
34. King, F. B.
35. Leland, A. B.
36. Morris, B. F. (2 horses, \$400; Henry rifle, \$50; \$450.)
37. McPherson, Daniel.
38. Overman, C.
39. Ott, Larry.
40. Ousterholt, D.
41. Peasley, Jos.
42. Plummer, A. F.
43. Poe, J. W. (Horse, \$100; pistol, \$25; \$125.)
44. Riggins, John.
45. Rice, F. M.
46. Rice, M. H.
47. Rice, C. L.
48. Rice, James.
49. Rice, J. N.
50. Rowton, J. G.
51. Swarts, J. A.
52. Shissler, T.
53. Swarts, T. D.
54. St. Clair, T. M.
55. Smith, Marion.
56. Snodgrass, J. M.
57. Sears, George. (Horse, \$200, and Henry rifle, \$50; \$250.)
58. Tellis, Vinca.
59. Truscott, M. H.
60. Vansice, Frank.
61. Wilmot, B. R.
62. West, Wesley.
63. Watson, J. A.
64. Wall, T.
65. Miller, J. A.
66. Shearer, Geo. M.
67. Gilton, T. W.
68. Woodward, Geo.
69. Smith, Ernest.
70. Kennedy, Hugh.
71. Price, P.
72. Mallick, P.
73. Penny, B.
74. Ready, P. H.
75. Tilcher, D. H.
76. Noyse, F.
77. Gano, T.
78. Markham, N.
79. Watkins, E. (Springfield rifle.)
80. Crea, James.
81. Harris, A. A.
82. Adkinson, Elijah. (Horse, \$100.)
83. Ward, T. L. (Horse, \$200.)
84. Fenn, S. S.
85. Brown, L. P. (Horse, \$200.)
86. Brown, Sydney B. (Horse, \$150; Henry rifle, \$50; \$200.)
87. Mitchell, Wm.
88. Fenn, Walter B.
89. Falkington, A.
90. Johnson, H. C.
91. Ragan, James.
92. Woods, C. B.
93. Sherwin, E. K.
94. Sherwin, Elbert.
95. Sherwin, Perry.
96. Johnson, Charles.
97. Odie, James.
98. Dormein, J. M.
99. Fountain, Clyde.
100. Surrridge, Thos.
101. Peterson, John.
102. Shepley, Elias.
103. Gaddy, William.
104. Sears, C. W.
105. Van Buren, Henry.
106. Richards, Joseph.
107. Myers, Henry.
108. Gould, Norman.
109. Helmer, Phillip.
110. Cone, H. W.
111. Gibbons, John.
112. Orcutt, Isaac.
113. Getter, J. H.
114. Mallory, N. B.
115. Cone, Chas. F.
116. Cone, C. P.
117. Van Sicle, A.
118. Large, Samuel.
119. Kelley, John S.
120. Carey, James.
121. Wood, John.
122. Howard, M. B.
123. Treblecock, Wm.
124. Ramsey, John.
125. Stuart, John.
126. Smith, Abner.

MOUNT IDAHO, IDAHO, August 8, 1877.

I certify that this is a true copy of the original roll of officers and volunteers enrolled at Mount Idaho, Idaho, June 15, 1877.

JAMES P. CANBY,
Major and Paymaster, United States Army.

Lewiston Volunteers.

Name.	Rank.	Residence.	Date of enrollment.	Muster out of service.
Ed. McConville.....	Captain	Lewiston	June 28	Aug. 28
Martin Williams.....	First lieutenant	do	do	Do.
Randolph Keen.....	First sergeant	do	do	Do.
Wm. Danny.....	Corporal	do	do	July 29
Henry Archer.....	Private	do	do	July 29
W. S. Stafford.....	do	do	do	Aug. 28
James Mustard.....	do	Union Flat	do	Do.
Geo. Pitt.....	do	Sacramento Valley, Cal.	do	Do.
J. Carlton.....	do	Lewiston	do	Do.
Henry Pohlsen.....	do	do	do	July 20
W. G. Ritchie.....	do	do	do	Do.
G. E. Colwell.....	do	do	do	Do.
Oliver Wishart.....	do	do	do	Do.
Albert Wisner.....	do	do	do	Aug. 28
Thomas Norman.....	do	Paradise Valley	do	Do.
Geo. Gaunt.....	do	Lewiston	do	July 20
Robt. Bruce.....	do	Colfax, Wash.	do	Aug. 28
Geo. Bickle.....	do	Watertown, N. Y.	do	Do.
Ridgely Howard.....	do	Walla Walla	do	Do.
John Maxin.....	do	Lewiston	July 20	Do.
Chas. Adams.....	do	Humboldt Bay, Cal.	do	Do.
Geo. Oglesby.....	do	Paradise Valley	do	July 29
James Sallee.....	do	Dayton, Wash.	do	Aug. 28
I. S. Pentler.....	do	do	June 28	Do.
Richard Roberts.....	do	Lewiston	Aug. 3	Do.
Raymond Arrant.....	do	do	July 29	Do.
Perry Sherwin.....	do	Slate Creek, Idaho	do	Do.
Peter Davis.....	do	Lewiston	July 20	Do.

Company A, Columbia County Volunteers.

Name, etc.	Residence.	Age.
Capt. George Hunter.....	Dayton, Wash.	43
First Lieut. Sime Watrous.....	do	44
Second Lieut. John T. Ford.....	do	26
Ord. Sergt. Thomas H. Crawford.....	do	29
Second Sergt. Charles N. Clark.....	do	25
Third Sergt. Milton F. Morgan.....	do	28
Fourth Sergt. John H. Ling.....	do	22
Fifth Sergt. Joseph F. Hall.....	Paradise Valley, Wash.	22
First Corp. Isaac J. Schrivner.....	Dayton, Wash.	28
Second Corp. Fred Kenyvn.....	do	22
Third Corp. William C. Vaughn.....	do	28
Fourth Corp. George P. Bickers.....	do	26
<i>Privates.</i>		
Martin R. Adams.....	do	28
Wiley Baldwin.....	do	22
James W. Butler.....	do	25
Jerome R. Castle.....	do	21
Samuel Dillma.....	Paradise Valley, Wash.	23
Newton Davis.....	Dayton, Wash.	22
Dennis L. C. Edmondson.....	do	20
Thomas S. Edmondson.....	do	22
Willis E. L. Ford.....	Walla Walla, Wash.	21
Clarence N. L. Ford.....	do	19
Latham P. Freeman.....	Paradise Valley, Wash.	23
William L. Grote.....	Dayton, Wash.	17
Byron L. Gates.....	do	28
Nineveh Hatley.....	Walla Walla, Wash.	31
Andrew J. Harris.....	Dayton, Wash.	29
George C. Kenyon.....	do	20
Theodore Lowery.....	do	18
Thomas Norman.....	do	22
Jasper N. McLain.....	do	22
Linga G. Sparks.....	do	24
Sulathael Stephens.....	do	22
Alfred B. Standiford.....	do	19
Howard B. Kielgley.....	do	25
James W. Turner.....	do	25
Louis M. Tielwel.....	do	20
James A. Woodward.....	do	22
Frank C. White.....	do	28
John C. Zumult.....	do	42
H. S. Thomas.....	do	37
John Weiss.....	do	

Pataha Rangers, Washington Territory Volunteers.

John W. Elliot.
Eugene S. Wilson.
Ambrose A. Owsley.
Thornton W. Owsley.
Homer Bounds.
Willard Bounds.
Robert Short.
— Elliot.
Frank McBreardy.
John M. Williams.

John M. Ball.
Danl. McKay.
John Campbell.
Saml. Shawlay.
Chas. Shearer.
Edward Coe.
W. B. Treedy.
Robert Bruce.
Lewis Tewart.
Thomas Cumpacker.

Newton Thomas.
Henry C. Abbe.
Henry Vaughn.
I. N. Kedge.
Geo. Pitt.
John Hale.
Dan Williams.
Frank Cartwright.

Official copies to accompany letter to the Secretary of War of this date (3547 A. G. O., 1890).

J. C. KELTON,
Adjutant General.

ADJUTANT GENERAL'S OFFICE, March 22, 1890.

The Grand Ronde and Wallowa Rangers, Oregon Volunteers, which came into service in June, 1877.

Names of members.	Days' service.	Names of members.	Days' service.
1. W. R. Boothe (captain).....	23	21. L. Wright.....	23
2. J. W. Cullen (first lieutenant).....	23	22. Thomas Graham.....	23
3. A. C. Smith (second lieutenant).....	23	23. L. Craig.....	23
4. Thomas Barrett.....	21	24. T. A. Rinehart.....	14
5. William McCumsey.....	21	25. A. Weekley.....	15
6. George McCumsey.....	21	26. J. Slack.....	15
7. James Masterson.....	21	27. Harvey Rinehart.....	21
8. D. C. Davis.....	21	28. B. Thomas.....	23
9. James Morrison.....	10	29. C. F. Chattin.....	17
10. T. M. Fine.....	10	30. A. Terwilliger.....	10
11. Isaac Chrisman.....	15	31. James Tully.....	23
12. George Richardson.....	15	32. William Hudson.....	23
13. Logan Schaffer.....	15	33. J. W. Wood.....	23
14. Henry Schaffer.....	15	34. Nat. Gray.....	8
15. Eli Ostrander.....	83	35. George Gray.....	8
16. Amos Gibbs.....	10	36. Thomas Chandler.....	8
17. William Masterson.....	15	37. William Mason.....	8
18. William Richardson.....	15	38. Stowell Paine.....	8
19. J. T. Ward.....	33	39. E. B. Morelock.....	20
20. J. I. Sturgell.....	33		

Capt. A. J. Bowland's company of scouts, Idaho Volunteers, which came into service in July, 1878.

Names of members.	Days' service.	Names of members.	Days' service.
1. A. J. Bowland (captain).....	67	11. James Sutton (private).....	29
2. Albert Heed (private).....	67	12. William Allison (private).....	29
3. Harry Warbertson (private).....	67	13. Nelson Buell (private).....	29
4. John Hart (private).....	67	14. John Atwell (private).....	29
5. Alonso Jewell (private).....	30	15. Edward Howell (private).....	25
6. William F. Blair (private).....	67	16. George Hopteller (private).....	18
7. H. M. Freeman (private).....	67	17. William South (private).....	18
8. Amos Nettleton (private).....	67	18. Thomas Lyons (private).....	18
9. Joseph Joice (private).....	30	19. S. Fry (private).....	15
10. H. P. Linder (private).....	59		

A word now in reference to the Bannock war.

This war was occasioned on account of a misunderstanding of the conditions of a treaty that had been entered into by the Indians and the Government. The treaty stipulated that the Bannocks were to have "reasonable portions of the Portneuf and Kansas Prairie country." Undoubtedly the insertion of the word "Kansas" was a mis-

take. It should have been "Camas," a name that defined a section of prairie country to the northwest of these Indians and which took its name from the fact that the camas grew there in great abundance. The western members of the committee know what the camas is, but probably I should say in passing that the camas is a species of lily, the bulb of which is rich and succulent and was regarded as a very choice food by the Indians. Other points in the treaty were in dispute, but probably this was the most serious. At the time the treaty was made and for several years thereafter there were no white settlers upon the Camas Prairie. In 1878, however, the settlers began to make use of this prairie for the herding of their cattle and horses and for the fattening of their hogs.

Indians drifted into the section of country in the late spring and probably reached the Camas Prairie on May 27, 1878, at a point about 10 miles southwest of what is known as the crossing of Corral Creek, in what is now Blaine County. At first the Indians seemed perfectly friendly, but on the morning of the 28th of May they made an attack upon a camp that was maintained by three white men convenient to their herds and one of the stockmen was wounded, and the resulting fight was an open manifestation of the feeling of dissatisfaction that existed on the part of the Indians toward the white settlers. The news of the Indian outbreak spread rapidly.

This outrage was immediately followed by the killing of several white settlers during the next few days; the destruction of freight wagons; the plundering of houses and the driving away of cattle and horses. The Indians themselves were not a unit in favor of warfare, but one of their number, Chief Buffalo Horn, gathered around him some 200 warriors and began his attacks.

The Indians drifted southwesterly through the Glenss Ferry section of country and over into the Bruneau Valley. Col. Bernard was at Boise in command of the Boise Barracks and upon his being notified of the trouble he set out at once in pursuit, taking with him Col. Rube Robbins who was a volunteer scout in the preceding year in the war against the Nez Percés, and he had even been taken by Gen. Howard as he pursued Chief Joseph's band across the Rocky Mountains. By the time Col. Bernard reached the Camas Prairie country, the hostile Indians were well out of it, and the United States troops immediately set out in pursuit toward the Bruneau country.

Before the troops encountered the Indians, a small company of volunteers was raised and placed under the command of Capt. Harper. They started out toward the scene of hostilities and met the Indians near a point called South Mountain or Battle Creek. The Indians outnumbered the volunteers almost 10 to 1, but by reason of their location and bravery of the men, the little band under Capt. Harper held out against the Indians all day and probably killed a good many of their number, while the Indians killed two of Capt. Harper's men. Others were wounded.

Capt. Harper's troop the next day broke camp and moved westward and the Indians did not care to pursue the party. They continued their depredation in this section of country, murdering the driver of the stage line on the Winnemucca Road and even killing cattle for the apparent delight of slaughtering them, leaving their carcasses strewn along the road.

By June 20, the hostile Indians had gathered other unfriendly tribes into their number and by this time they had assembled about 2,000, of which number about one-half were men. These recruits came from other tribes such as the Duck Valley Indians, the Lemhi Indians, the Winnemuccas, the Malheurs and Snake Indians. After much effort, in which Col. Robbins played an important part as a scout, the Indians were engaged in a battle in a canyon on Silver Creek, the troops being under the command of Col. Bernard of the United States Army, the first day, which was June 23, and following this under command of Gen. Howard, who arrived early in the morning of June 24.

The loss to the troops was the death of one scout and four regulars; with several others, including Col. Robbins, suffering slight wounds. It is estimated that the Indians lost about 100. Many others were wounded. The Indians did not wait for the morning of June 24 to continue the fight, but retired in a northwesterly direction followed by the troops and their course continued over into the State of Oregon, toward the John Day River, and beyond.

The Indians committed other depredations and finally were overtaken on July 8 in the Blue Mountains. Other engagements occurred in which one of the troops was killed and several wounded and in which several of the Indians were killed and the others driven into the timber of the mountain country. Continued depredations were made over a wide stretch of country and terror existed in all that section of country from Lewiston, Idaho, and north, and from there down through the Walla Walla country and reaching into the Umatilla region in Oregon, and east of that part. Volunteers responded from this section as well. A company was organized at Walla Walla under the command of Capt. Charles Painter. Another one was organized at Lewiston, Idaho, under Capt. Ed. McConville. Lawless Indians from this section of the country joined the Bannocks and a band that was probably a remnant of Chief White Bird's Band that had participated in the Nez Perce War the previous year came over from Montana, having worked considerable havoc in the Bitter Root Valley, killing settlers and stealing cattle.

These Indians were overtaken by Lieut. Wallace, and in a battle on the headwaters of the Clearwater River, 6 of their number were killed; others were wounded, and something like 19 were captured, besides considerable stock. Desultory fighting occurred during the summer, and much policing was done by the troops and by the volunteers who prevented the union of the Indian bands. Gen. Wheaton, Col. Forsyth, and Col. Sandord, all participated with Gen. Howard in this work. Several of the leading chiefs were killed, including Buffalo Horn, Bear Skin, and Egan. Toward the latter part of July the Indians began to break and to go back to their respective tribes. As they did so, much damage was done and devastation committed, for which the Indians were not punished.

The following year, 1879, renegade Indians from several troops who, on account of their roving habits and the living upon the mountain sheep and stock that they could steal from the pioneers, became known as "Sheep Eaters," continued the work of depredation of the preceding two years. Ranchmen were killed not far from the town of Warrens and again the whole section of country was thrown into a state of alarm. At Loon Creek north of Idaho City, quite a number of Chinamen who were engaged as miners were murdered. The

nature of Indian warfare and the character of the country combined to make it difficult for the Indians to be brought to account.

Besides the forces of the United States under Col. Bernard, volunteers were also pressed into service under Col. Robbins. Several engagements occurred—one in the Salmon River country at a point known as Big Creek and where one soldier was killed. Finally the Indians were practically driven to peace on account of lack of supplies and arrangements were made by which their surrender was accomplished and about 60 of their number were taken by Lieut. Farrow to Vancouver. Col. Bernard and his command and Col. Robbins with his scouts, had spent part of the spring and the entire summer in this work, and finally reached Boise early in September.

These are the three several engagements in which the volunteers of my State and adjoining States cooperated with the forces of the United States in subduing lawless Indians in that section of the country, and it seems to me these volunteers have rendered services that deserve the recognition of the Congress.

I would like to insert, as a part of my remarks, certain reports or lists of names of those who were members of the organizations, and possibly some documents, that will, I think, be of interest in showing the works that were performed by these men.

The CHAIRMAN. Referring to the list of names, how extensive will they be?

Mr. FRENCH. I think I have over 400 names here from my own State. I think I have possibly 100 or 200, chiefly from the States of Washington and Oregon, in addition thereto. It will only make two or three pages of print, I believe.

The CHAIRMAN. Without objection, they will be incorporated in the record.

(The documents referred to by Mr. French will appear at the close of his remarks.)

Mr. SELLS. Mr. French, if one of these bills—for instance, Mr. Hawley's bill—should be enacted into law pensioning all of these men, regardless of length of their service, would not the effect of it be to pension about every man living in the West to-day who was living there during these Indian wars?

Mr. FRENCH. I do not think so at all.

Mr. SELLS. Were not the great majority of them included?

Mr. SMITH. They were not connected with organizations, you know.

Mr. FRENCH. I think not. I have a list here, and I think it is less than possibly 400 men in the State of Idaho who were definitely connected with organizations.

The CHAIRMAN. Mr. Hawley wishes to go a little further than that. Mr. French desires to recognize those men who may have volunteered without joining any organization.

Mr. FRENCH. Of course, if we were to go further and recognize the members of these three companies which, in Owyhee County, subdued the Indians without depending upon the Federal Government at all, we would recognize a band of only about 100 men. If we would go further than that and recognize the band of men who came up from Utah and to the little settlement in the Lemhi Valley, we would recognize, I think, only 100 men. It was in round numbers a body of 100 men.

Mr. HAWLEY. One hundred men originally?

Mr. FRENCH. Yes; approximately that number in each instance.

Mr. HAWLEY. They are not half of them alive now.

Mr. SELLS. I understood your intention was to give a pension to every man who had ever been engaged in a skirmish with the Indians. Under Mr. Hawley's bill it does not require that there shall be a record of his service, but he must prove his service by such evidence as is demanded by the War Department.

Mr. HAWLEY. A service of 30 days.

Mr. SELLS. It is not necessary for the records of the War Department or the State Department to show there was ever any such service.

Mr. HAWLEY. He must prove a service of 30 days. There will be very few of those.

Mr. FRENCH. In the instances to which I have referred, I think 400 men would include all of them that supplemented the work of the officers of the United States Army and were actually under the command of the officers of the United States Army in the first instance. Many of their members, of course, have died; possibly half of their number.

Mr. SELLS. You mean in the State of Idaho?

Mr. FRENCH. Yes; and that includes also those from the State of Washington and the State of Oregon who were enlisted in the Nez Perce and Bannock campaigns. If you go beyond that and include the two other campaigns made against the Indians where the United States Government was not called on, I think that 200 would represent the approximate number of the men engaged, and that would include something like 100 from the State of Idaho and something like 100 from the State of Utah. Of course, since that time possibly their numbers have diminished 50 per cent.

The CHAIRMAN. In that connection, the War Department has defined an Indian war, and in that connection uses the following language:

That the mere making of predatory incursions by parties of Indians, with whose tribe no general hostilities have been inaugurated, does not constitute an Indian war.

That is the War Department's definition of an Indian war. Taking that definition, the War Department has undertaken to determine, through a determination of the question of the wearing of the "Service in war" chevrons by enlisted men of the Army, what Indian campaigns approaching the magnitude of wars were such as to entitle enlisted men to wear that chevron. The department says that the campaigns against hostile Indians since 1865 that were selected and announced as being such are as follows:

Campaigns in southern Oregon and Idaho and northern parts of California and Nevada, 1865-1868.

Campaign against the Cheyennes, Arapahoes, Kiowas, and Comanches, in Kansas, Colorado, and Indian Territory, 1867, 1868, and 1875.

Modoc War, 1872 and 1873.

Campaign against the Apaches of Arizona, 1873.

Campaign against the Kiowas, Comanches, and Cheyennes, in Kansas, Colorado, Texas, Indian Territory, and New Mexico, 1874 and 1875.

Campaigns against the northern Cheyennes and Sioux, 1876 and 1877.

Nez Perce War, 1877.

Bannock War, 1878.

Campaign against the Ute Indians in Colorado and Utah, September, 1879, to November, 1880.

Campaign against the Apache Indians in Arizona, 1885 and 1886.

Campaign against the Sioux Indians in South Dakota, November, 1890, to January, 1891.

The War Department has never undertaken to determine the exact dates of the beginning and ending of these Indian disturbances.

Mr. SELLS. Let me ask, Mr. Chairman, that you read into the record an extract from a letter of The Adjutant General to Congressman Rucker under date of May 4, 1912.

The CHAIRMAN. In a letter, dated May 4, 1912, The Adjutant General, Gen. F. C. Ainsworth, stated to Congressman A. W. Rucker that:

The list of campaigns against hostile Indians since 1865 that were selected and announced as approaching the magnitude of wars and as being such as to entitle enlisted men to wear the service-in-war chevron is a complete list of such campaigns from 1865 to date. The only campaign in that list that falls within the period mentioned in your letter of yesterday is that against the Sioux Indians in South Dakota, November, 1890, to January, 1891.

That refers to "your letter of yesterday," which is somewhat indefinite. I do not know what the reference means.

Mr. SELLS. That seems to be in distinct contravention of the statements made there in his prior letter of January 13, 1912, as set forth in report No. 1417, of January 30, 1914.

Mr. FRENCH. Of course, I think his prior letter actually includes the wars in which the United States fought participated. As you will notice, I have already spoken in behalf of those who volunteered their services for the Nez Perce War and the Bannock War of 1877-78. I have mentioned, also, the other campaigns, two of which were handled without any assistance whatever from the Federal Government and which, probably, we could not hope to have recognized; and then the other campaign of 1879, a continuation, you might say, of the campaign of the Bannock Indians in 1878, which was known as the campaign against the Sheep Eater Indians, some renegade Indians from several tribes, who were finally driven over into Oregon.

Mr. HAWLEY. Mr. Chairman, whatever legislation you report and is passed, irrespective of any of these regulations regarding the service marks, which regulations do not govern us, or will be that which will guide the Pension Office and the Department of the Interior in determining who shall participate. For instance, if my bill should be the bill you report—

The CHAIRMAN (interposing). Do you understand that in reading this extract from Gen. Ainsworth's letter I merely wanted to show that the War Department itself had undertaken to define an Indian war in contradistinction with a skirmish with Indians? Of course during all the time white men have been in the West, up to 1892 and possibly as late as 1898, they have had combats with Indians.

Mr. HAWLEY. I would like to make another statement. When you asked me the number of men who would be benefited, I meant the estimate I gave of not to exceed 4,000 to include all from every part of the country that would be benefited if my legislation should be passed.

Mr. FRENCH. Do you mean all wars in this period?

Mr. HAWLEY. All of them that would be benefited by the bill I propose, not only from the section I represent but everywhere else.

The CHAIRMAN. Let me get the idea of your bill. The thought of your bill is this, as I understand it, that if a man volunteered to fight the Indians and served 30 days in such warfare or in an effort to get into such warfare he would then be entitled to a pension under your act, without having joined either the State military organization or the national military organization?

Mr. HAWLEY. That is right with one exception. If he joined a military organization—because they did not have time sometimes to get the State authorities in motion—and was engaged in that war for 30 days and took part in the war in some fighting for the protection of life, property, wagon trains, settlements, mails, or anything in which there was involved fighting or danger, he should be pensioned; not if he started out and there proved to be no hostility or the warfare was over before he got there.

The CHAIRMAN. Would it be your idea that it is necessary to show that shots were actually exchanged between the forces with which this man was connected and the Indians?

Mr. HAWLEY. I think there should be some evidence that there was actual danger and actual fighting. I had no thought otherwise than that they should see actual fighting.

The CHAIRMAN. It seems to me the most difficult problem confronting the committee is that of determining the character of the service that the applicant for a pension must establish before he would become under the provisions of the bill. In that connection, it seems to me that Gen. Baldwin should be able to shed considerable light upon the subject.

The CHAIRMAN. Going on the theory, Gen. Baldwin, that we want to report a bill that will pension the man who did the fighting on the Western frontier, the man who actually went out and battled with the Indians, what is your idea concerning the limitations we should place in the bill?

STATEMENT OF GEN. FRANK D. BALDWIN.

Gen. BALDWIN. Mr. Chairman and gentlemen of the committee, I think in most cases, or in every case in fact, that in the getting to the battlefield occurred the greatest losses. For instance, take the Eighteenth Kansas. Before they got into any danger at all, the heaviest losses occurred from disease. You will find that is the case in every organization, unless they jumped right up at the start and went to fighting immediately. In any organization preparing for service, in getting them under discipline, etc., you will find the rate of death from disease is greater than that of any battlefield; that is, they average up. I do not think you could distinguish, and it would be a wrong distinction to make, that they must be under fire in order to get a pension.

The CHAIRMAN. When did you go to the West, General?

Gen. BALDWIN. I went there in 1866, right after the Civil War.

The CHAIRMAN. You did serve in the Civil War, as I recall it?

Gen. BALDWIN. Yes, sir.

The CHAIRMAN. Did you serve continuously in the West?

Gen. BALDWIN. Until 1898.

The CHAIRMAN. At that time you were in command of the Department of the Colorado, were you not?

Gen. BALDWIN. No, sir; in 1906 I was in command of the Department of the Colorado.

Mr. MURDOCK. What was your first post in the West, General?

Gen. BALDWIN. I went into Kansas. My first post was Fort Harker, Kansas.

The CHAIRMAN. Your services in the West covered practically the entire period that it is suggested that we should cover by this bill, is it not?

Gen. BALDWIN. Yes, sir; it does, and more too. As I understand it, that only goes to 1892.

The CHAIRMAN. One bill goes to 1898, from 1865 to 1898.

Gen. BALDWIN. I do not think there was any Indian war, what you would call "war" after 1891, after this conclusion of peace on Pine Ridge in South Dakota. I was engaged out there in nearly all of these campaigns, 1874-75, in the Nez Perce campaign, 1876-1879, in the Bannock campaign, and in the Pine Ridge or South Dakota Messiah War. I was actually in the field in all those campaigns.

The CHAIRMAN. Suppose you give us the benefit of your views on the general policy of pensioning these men.

Gen. BALDWIN. If they rendered service, I do not care whether they got out under fire or not; they might have been detailed or detained to guard the wagon train, which is just as essential as fighting the battle. I think that any man that earnestly went into the campaign and did his duty, as he was ordered in connection with that campaign, either as a scout or a wagon master—I will not say wagon master, but as a guard to the train under arms—should be provided for, whether he served 30 days or 6 months. There would be great scares sometimes, and men would turn out with no idea but what they are going into actual hostilities, and it is settled one way or the other, but they have gone out and shown their good will. I am saying if any one is given a pension, all should be taken into the same category.

Mr. TAGGART. You apply the Bible theory to those who went down to battle and those who watched the stuff equally?

Mr. SMITH. Did you say you were in the Nez Perce campaign?

Gen. BALDWIN. I saw the capture of Chief Joseph.

Mr. FRENCH. Were you in Idaho?

Gen. BALDWIN. No, sir.

Mr. FRENCH. You joined them later?

Gen. BALDWIN. Howard chased them over there. We captured him just south of the Yellowstone River, on the south side of the river.

The CHAIRMAN. In your experience with the Indians, what was your experience with the volunteer troops? Do what extent did they volunteer to participate in these conflicts?

Gen. BALDWIN. I never have served with volunteers in Indian warfare. I saw the Eighteenth Kansas, first battalion, when it arrived at Fort Harker, and I know their losses were heavy. We had about six or seven hundred regular troops there, and had some Cavalry. We lost over 100 men there. We covered over their period. The Kansas battalion came in and went out. I did not follow them after they left, and never read their history. I know

from the record of the losses of the Seventh Cavalry and they have always spoken of them in the highest terms. I know the winter of 1868 was one of the most severe winters we ever had in that country. At the time Custer went down there and fought the Battle of Washita, and Black Kettle was killed, I do not know how many Indians were killed, but we lost about 50 men killed there.

Mr. SELLS. Were the members of these particular organizations who participated in the Indian campaigns for the most part residents of the West, or did they come from over the entire country?

Gen. BALDWIN. The volunteers?

Mr. SELLS. No; the regulars.

Gen. BALDWIN. Oh, they came from all over the United States, and Europe, too. A great many of them in the early days were foreigners. Nowadays it is different. They are nearly all Americans now.

The CHAIRMAN. You had no experience with these State organizations?

Gen. BALDWIN. No, sir; I have never served with them. The only volunteers—and you can hardly call them volunteers—were those scouts, who were the most valuable auxiliary we ever had.

The CHAIRMAN. Were they regularly enlisted in the Army?

Gen. BALDWIN. They were regularly employed, but never enlisted. We paid them so much a month—\$30 or \$40, according to the value of their services. Sometimes their services would be so hazardous in attempting to perform a duty that we had to offer them very large pay. I have paid my scouts as high as \$500 to make a trip of 12 hours, because it was right through the hostile camp.

Mr. SELLS. Could you give us any idea as to how many men served in these campaigns in the West, covered by the periods enumerated in the bill, from about 1865 to 1892—and I refer now to the Regular Army men?

Gen. BALDWIN. I will tell you where you can get the exact data, and that is from the War Department.

The CHAIRMAN. The War Department seems to be weak in that particular.

Gen. BALDWIN. They ought not to be weak.

The CHAIRMAN. The War Department states that no compilation has ever been made by the War Department from which the number of men engaged in the Indian wars from 1865 to 1890, inclusive, can be obtained. They say that to make a compilation from which even an approximation of that number could be obtained would require the expenditure of a great amount of time, if it would be possible to make it at all. They say that most of the Indian wars and disturbances of that period were participated in only by troops of the Regular Army, and while an organization may have been continuously engaged in connection with a particular disturbance for some time, the enlisted personnel of that organization might have changed, and probably did change materially, during that time because of the expirations of terms of service of men and the assignments of new recruits to take their places. So the War Department seems unable to give us definite figures. Perhaps you could approximate some of these. For instance, take the campaign against the Cheyennes, Arapahoes, Kiowas, and Comanches in Kansas, Colorado, and Indian Territory, 1867, 1868, and 1869.

Gen. BALDWIN. I was not in the campaign of 1867 and 1868, but I was in the campaign of 1874-75.

The CHAIRMAN. That is also mentioned here. How many men, in your judgment, were engaged in that conflict?

Gen. BALDWIN. There were eight troops of the Sixth Cavalry—oh, I would have to look up my records to see. I should say all told there were troops taken from the Fifth Infantry, six companies, I think; a squadron of the Eighth Cavalry; then from Fort Sill, under Davidson, was the Tenth Cavalry and some part of the Eleventh Infantry; from Texas, under McKenzie, was the Fourth Cavalry, a portion of the Ninth Cavalry, and I think some of the Twenty-fourth. Speaking off-hand, it having been a good while ago, I could not exactly recall. The official report of Gen. Miles, the official report of Gen. Davidson, and the official report of Gen. McKenzie should be in the War Department. They are required to be accurate, both as to losses and strength, and all.

Mr. SELLS. About how many men would be in those regiments that you have enumerated?

Gen. BALDWIN. A troop of cavalry in those days you could figure on having from 60 to 80 men present for duty.

The CHAIRMAN. Probably in that war there were more than 2,500?

Gen. BALDWIN. I should say, taking them altogether, there were perhaps 3,000 to 3,500.

The CHAIRMAN. So far as you know, there were no volunteers in that war?

Gen. BALDWIN. There were no volunteers; nothing but those scouts I spoke of.

The CHAIRMAN. Would you think the scouts should also participate in this pension legislation?

Gen. BALDWIN. If they do not, I certainly think they ought to. They were such magnificent men, and rendered such magnificent service, such as was never rendered by any other class of men, that they certainly ought to be recognized.

Mr. HAWLEY. May I ask a question, Mr. Chairman?

The CHAIRMAN. Certainly.

Mr. HAWLEY. What was the average age of the men engaged in those wars, Gen. Baldwin?

Gen. BALDWIN. In the Regulars?

Mr. HAWLEY. Yes.

Gen. BALDWIN. I heard the chairman read a report or an article that coincided with my memory.

The CHAIRMAN. That was an article by the secretary.

Gen. BALDWIN. Right after the war the age was much greater than it was before. From 1878 down the average has been pretty close to 21 years, 21 to 23. The average now is under 22 or 23 years.

The CHAIRMAN. The article to which the general refers was written by the secretary of the Indian War Veteran Association, and he places the average age somewhere between 25 and 30 years.

Gen. BALDWIN. That was right after the war.

The CHAIRMAN. Going on the theory that most of them had served in the Civil War, yes.

Mr. HAWLEY. Under the average estimate of the mortality tables of the insurance companies, the actuaries reports, not over 10 per

cent, or between 10 and 20 per cent, of those people would be living to-day.

The CHAIRMAN. Those tables do not apply to the westerners.

Mr. HAWLEY. No; because their vitality is the greater; that is true. But in fact, under the actuaries' estimates, all of them ought to be dead.

Mr. SELLS. As a matter of fact, would not the gentlemen who introduced bills on this subject be pretty well content if the soldiers who were actually mustered into service were accorded pensions?

Mr. HAWLEY. I do not think it would meet the demands of justice for the situation. There are three classes. I have made a considerable study of this matter, and have talked with those who are interested in legislation, and with the information I have had from them personally and what I myself knew, I do not feel that I can agree with you. The stories soldiers have told me are not so much of their own suffering and service, but we would pass some man on the street, and they would give me a little history of his work and the service he rendered, and it just gradually grew up in my mind that not only were the enlisted men in the service, who were called out by a regular order from the State, entitled to a pension, but the others, who rendered just as good service, just as important service, just as valuable service, should be recognized. The mere fact that some of them had a chance to get into an organization and had time to get into an organization does not make their service any more valuable or important than the service of the man who went suddenly, without any chance to organize or join an organization. In fact, the latter man may have rendered more important service, because he struck quickly.

Mr. SELLS. If we were going to pension all these man who saw service out there, no matter how short a service, regardless of the fact whether they were enlisted or not, would it not be right and proper to pension all men who were enlisted in organizations throughout the country known as home guards and who saw service of practically the same character during the Civil War?

Mr. HAWLEY. I do not know anything about the home guards, or enough about them to answer your question. You know more about that than I do.

Mr. SELLS. They were organizations which were raised in various sections of the country to protect people there from depredations of passing and hostile armies. In eastern Tennessee, which was intensely loyal to the Union, the Confederates would come in occasionally, and these home guards were organized there to protect the women and children as against the Confederates—about the same services that your people rendered out west there in repelling the attacks of the Indians.

Mr. HAWLEY. While I would not say anything to disparage their service, but I would commend it, yet when the Confederates attacked a settlement or came through, the women were not afraid. The women and children were not burned at the stake and tortured. The most they could suffer would be the loss of some property.

Mr. SELLS. Yes; that is true.

Mr. HAWLEY. They were fighting a war in a civilized manner, and these western people were fighting a very uncivilized enemy.

Mr. SELLS. I do not intend to offer any amendment to these bills seeking to pension that class of people who had service, but if we should pass your bill, we would certainly establish a precedent for future legislation along this very line.

Mr. HAWLEY. There would be that distinguishing feature of the character of the fighting. One was under civilized warfare and the other was under the most uncivilized warfare, which makes a difference just as wide as you can imagine.

Mr. SELLS. As a matter of fact, these home guards saw active service, as they were in fight after fight down there. Many of them are alive there now who were shot all to pieces during the war. The services which they rendered were, in my judgment, just as valuable as those of the men who were regularly mustered into the service and who saw active duty out on the field.

The CHAIRMAN. Gentlemen, is there anything further to come before the committee at this time?

Mr. HAWLEY. I think, Mr. Chairman, we owe a vote of thanks for your courtesy in holding this meeting to-night, after a long week's work, and for giving us the time you have to present our case [Applause.]

The CHAIRMAN. I am sure, as a member of the Committee on Pensions, I thank you for that, because it is seldom the Pension Committee is commended. It is frequently criticised, but seldom praised.

I think we all feel under obligations to Gen. Baldwin for having come here to-night. [Applause.]

Mr. SELLS. Mr. Chairman, before we adjourn, I would like to suggest to you that it might be well to ask these various Members, who have introduced bills on this subject, to see whether or not they can ascertain or get any information from their various States as to the number of men in their States who would be affected by this legislation. I do not refer there to the men who regularly enlisted and mustered in, but to those soldiers who rendered a short service of 30 or 60 days. It seems that the Members who introduced these bills are in a better position to obtain that information than are the members of this committee.

The CHAIRMAN. I am sure the committee will be glad to have that information.

Mr. FRENCH. I think I can furnish practically all my names right now for my State of Idaho, but of course not from the other States.

Mr. HAWLEY. Now living, you mean?

The CHAIRMAN. Yes.

Mr. HAWLEY. You do not want those who were enumerated in the organization originally, but those who are now living?

The CHAIRMAN. The number of men in the organizations originally, and the number of men that they believe are now alive.

Mr. SELLS. If the number of men who originally served is given, we can figure out pretty definitely the number of men who would be affected.

Mr. HAWLEY. I will try to get that information for you, Mr. Chairman.

The CHAIRMAN. Along the lines of Mr. Hawley's suggestion, I am somewhat puzzled to determine how you would determine a man's

service if he did not join some organization, either State or National. Suppose that a wagon train is crossing the Platte in Nebraska, in April, 1866, and is attacked by Comanche Indians. Suppose I had been living in that vicinity and I joined my neighbors in going to the rescue of the endangered men and women. Suppose we proceeded to pursue those Indians and engaged in that enterprise for a period of 30 days. Under your bill I would be entitled to a pension, would I not?

Mr. TAGGART. Would it not be proper to have the Secretary of Interior make such regulations as he deemed best, under which proof might be made?

Mr. HAWLEY. That is in the bill.

Mr. SELLS. If you leave that to the Commissioner of Pensions, I will guarantee you that none of the men will ever get a pension, because I have had some experience with the Pension Bureau, and if they are left to make the regulations and if you will have to prove to their satisfaction that a man had 30 days' service, you will never be able to get a pension.

The CHAIRMAN. I rather sympathize with Mr. Hawley's proposition, because I was born in the West and lived there all my life. I would like to recognize the volunteer Indian fighter if in some way we could define his service. I would not like to throw the thing so wide open that every brave man who lived in the West from 1865 to 1898 would be entitled to a pension. For instance, I have in mind this sort of an experience:

The Navajoe Indians went on a rampage and threatened the town of Durango in the southern part of our State. I guess every man who lived in those parts volunteered and prepared to defend Durango. There was no great loss of life; in fact, the Ute Indians joined the home guards in that instance and indicated they were quite willing to have a shot at the Navajoes. The thing blew over. But there were a hundred or a thousand such instances throughout the West. In a great many instances men did not serve 30 days at any one time. Then the question would arise: Suppose you served a week on one occasion and 10 days on another occasion, and so on, would you piece those services together so as to make 30 days?

Mr. HAWLEY. I had not thought of joining short services together, but my thought was this, as I have stated about the services of these men: When an organization met together, before it went into the fight, it would elect officers, and the men going would have a very good recollection of what was done. Each man would know when the other men of his immediate neighborhood started out and what they took with them, how long they were gone, where they had met the Indians, what days of fighting they spent. And even if we could only recognize those who could prove the amount of time they put in from the time they left until the time they returned from the battlefield—calling that the muster out—I think that could be established—justice would be done to many deserving men. They had a voluntary organization, and men are just as honest in voluntary organizations as they are in the other organizations. We take the testimony of these men in court and take away life and property upon their evidence, and we ought to take it in this matter. A good old judge out in my country, Judge Galloway, a Democrat, said one time that an honest

man is always under oath. Put these men under oath and take their sworn testimony. Where they had 30 days' service, they could establish that fact by affidavit.

Mr. SELLS. Do you believe your bill, if we were to favorably report it out, would ever run the gauntlet of the House and Senate?

Mr. HAWLEY. You can never tell quite what ideas appeal to bodies of men, but I think it would, yes.

(After informal discussion:)

The CHAIRMAN. There seems to be nothing further to come before the committee at this time, and the committee will therefore stand adjourned.

(Thereupon, at 10.45 o'clock, p. m., the committee adjourned.)

STATEMENT OF HON. JOSEPH HOWELL, MEMBER OF CONGRESS FROM UTAH.

HON. EDWARD KEATING,

*Chairman, and Members Subcommittee of the
Committee on Pensions, House of Representatives:*

Mr. Chairman and gentlemen of the committee, when your committee convened on March 7, 1914, for the purpose of securing information concerning the several bills pending before you having for their object the pensioning of survivors of the various Indian wars not covered by the present pension laws, I was necessarily absent from the city as a member of a congressional committee investigating labor troubles in the copper fields of Michigan.

In reading the hearings, I find that some inquiry was made by Mr. Keating, the chairman, as to conditions under which the Indian war service in Utah had been performed which I propose to pension in the bills I have introduced, now before your committee. For many years I have striven to secure such pension relief for Indian war veterans as is now brought before you for your consideration. The words of the immortal Lincoln, when he declared that the Republic must "care for him who shall have borne the battle and for his widow and his orphan," have found an abiding place in the hearts of the American people. And this doctrine has been proclaimed anew by succeeding Presidents and has become the settled policy of the Nation.

In harmony with this wise, just, and benign policy, Congress has granted from time to time pensions to those who served in various Indian wars and disturbances. The act of June 27, 1902, granting pensions to survivors of certain Indian wars mentioned therein, is the latest legislation of this character. Hon. Henry Clay Loudenslager, chairman of the Committee on Pensions, in reporting that bill, said:

The last of these wars occurred 40 years ago, and the estimated age of the survivors is fixed at 65 years, while the estimated age of the Seminole survivors is 94 years. Of the inestimable services of these pioneer men and soldiers we deem it unnecessary to refer. History recognizes the results they achieved. In the South and West they endured the greatest of privations, sacrifices, and sufferings. We owe to them largely, if not entirely, the acquisition of the vast empire of the Pacific Northwest.

It having been the policy of the Government and the uniform course of legislation that service pensions should be granted at the expiration of 40 years following the

ware for which said pensions have been granted, it will be seen that this period has been now reached as to all the wars mentioned in the present bill, while as to some over 77 years have elapsed since the war. Most of these old survivors are in needy circumstances, while all are in old age, and, as estimated by the Commissioner of Pensions, the average pensionable period can not extend beyond about seven years hence. Many of these aged men were omitted from the act pensioning survivors of Indian wars between 1832 and 1842, and for this reason the present bill is the more just, since it includes all the survivors of the recognized Indian wars prior to 1856.

The act of June 27, 1902, which was evidently intended to include all territorial militia actually engaged in Indian warfare up to at least 40 years before its enactment, failed to afford relief to a certain class of worthy Indian fighters who had been called out as the regularly Organized Militia to suppress Indian hostilities, but who had not been mustered into the service or received compensation from the United States. The service they performed was precisely similar to that performed by the regular troops, and exactly of the same character as that for which pensions have been granted to their comrades in arms. The men who fought Indians were isolated from civilization by a thousand weary miles of rugged mountain and uninhabited prairies, without means of speedy communication or intercourse. Their families and property were in constant jeopardy and peril from marauding bands of hostile, savage Indians. The dangers besetting them made it necessary that the settlers should be organized into military companies standing constantly prepared as "minute men" to go into active service at any moment in defense of the people against the cruel and treacherous foe. To this class belong the Indian war veterans of the Rocky Mountain West, who for 20 years were the defenders of the outposts of civilization against attacks and assaults of the red man. To their valor and self-sacrifice we owe an everlasting obligation.

They acted with promptness and decision in the face of impending danger; they did not question or palter when the fateful emergency arose; they gave no thought to the regularity of their service or the idea that future recognition or reward might hinge upon their names and service being enshrined in the archives of the War Department. They did their duty fearlessly, faithfully, and fully, in every crisis. They went bravely onto the battlefield against a foe that knew no code of ethics. Defeat meant cruel and torturing destruction to them and their loved ones. They counted not the cost; nor did they stop to calculate whether their services was regular or not with an eye on future recognition. They gave their strength and valor freely in defense of advancing civilization and the safety and lives of the people.

The protection afforded by the military service thus rendered by them was clearly such service as rightly devolved upon the General Government, but in the dread and danger that constantly confronted the settlers there was no time to await Federal action, if indeed the Government was able to respond. Delay or parley carried with it possibly indescribable consequences.

Now, coming to the history of the Indian wars in Territorial days; the early settlers of Utah, as well as of other States, were obliged to rely largely on Territorial militia for protection against attacks of hostile Indians. In 1849, and again in 1853, the Utah Militia was called into the field to suppress Indian uprisings. The Territory

presented to Congress claims in which the muster rolls were included for reimbursement for expenses incurred in these disturbances, which were allowed and paid. Under the pension act of June 27, 1902, those on said rolls who served 30 days were given a pension. Unfortunately, the muster rolls submitted at that time did not include all the companies that had rendered military service in those wars; but, in the administration of the said act of June 27, 1902, the Bureau of Pensions has refused to accept parole or other evidence of service and, as the claimants not included in the claim are not able to prove muster into the service of the United States or to show that the Federal Government ever compensated them for this service, their claims have been rejected. Much dissatisfaction has arisen among those whose claims were rejected, and it has thrown upon me a large volume of correspondence in attempting to explain the logic of the position taken by the Pension Bureau.

From 1853 to 1864 there occurred frequent depredations of hostile bands of Indians, which demanded the calling into the field of various companies of troops. The militia were called upon to be ready as "minutemen" in every town throughout the Territory to respond to a call for protection of life and property. It was in the summers of 1865-1867, however, that a most destructive Indian war commenced. A renegade chief, known as Blackhawk, gathered about him from 300 to 1,000 braves and proceeded to raid and plunder the settlements on the southern frontier of the Territory. Wherever a ranch or community was found insufficiently protected, his band would sweep down upon it, driving off horses and cattle, and spreading terror and consternation along their course. After a successful raid the Indians would retreat to their mountain fastnesses with their booty, only to reappear again in attack upon some unguarded place.

Col. Head, Superintendent of Indian Affairs at that time, and former Indian superintendent, Col. Irish, both placed the situation before the War Department and called for adequate military force to afford protection. A reply from Gen. Sherman stated that the militia of the Territory must be relied upon to defend the people, as all of the United States troops available were needed for the protection of the overland mails. The governor of the Territory put into the field at once a large force of militia for the defense of the settlers. Arms, ammunition, transportation, cavalry horses, and supplies, were freely contributed for the campaign, and were rushed to the seat of war. It was soon found that the service consisted mainly in guarding the exposed frontier settlements. It was difficult to engage the wily Indian in battle, but several fierce engagements took place.

For three years, during the summer months, the Indians carried on this vexatious guerilla warfare, the seat of which was in Sevier, Piute, and San Pete Counties, and extending more or less to the counties of Wasatch, Utah, Millard, Beaver, Iron, Washington, and Kane, covering an extensive frontier and rendering it necessary to have a strong military force constantly in the field. During this period more than a hundred frontier settlers were killed by hostile Indians, and whole communities were preserved from horrible

massacre only by the valor and vigilance of the troops. Despite every effort to protect them, the settlers suffered a tremendous loss of property from these marauding and hostile Indian bands. Six extensive and flourishing settlements were abandoned in Sevier and Piute Counties; these settlers having been despoiled of nearly all they had, their livestock and teams being mostly driven away.

After three summer campaigns of destructive guerilla war, the Indians were forced into submission and a treaty of peace was negotiated and ratified.

On February 21, 1868, the governor and Legislative Assembly of Utah memorialized Congress for reimbursement for expenses incurred during this war, but the claim presented at that time has never been paid. Hon. Charles Durkee, governor of Utah, in approving this memorial, certified to the justness of the claim as follows:

EXECUTIVE OFFICE, UTAH TERRITORY,
Salt Lake City, January 9, 1869.

I, Charles Durkee, governor of Utah Territory, do hereby certify that the military service rendered by the militia of this Territory comprised in the foregoing accounts was absolutely necessary, and was therefore sanctioned and authorized by me at the time specified, and that the accounts are just.

CHARLES DURKEE, *Governor.*

No one can deny that the State of Utah has a just claim against the Government for this service; but the men who saw service are content to waive their claim for compensation if the Government will manifest its appreciation of their invaluable military service by honoring them with a service pension.

These troops served in the field for varying terms of from two to six months. They were called out by the governor to defend the people against hostile Indians. There are abundant precedents wherein pensions have been granted to volunteers performing precisely the same service. This service is exactly similar, but of greater length, to that rendered in the Walker Indian War of 1853 in Utah, which service was covered by our pension laws.

For 10 years I have been trying to secure recognition for these veterans, but have been halted at the door of the Pension Committee by the technicality of a demand to show their enlistment and muster in or compensation from the United States.

The few remaining survivors of those perilous times have formed an organization known as the Utah Indian War Veterans. They meet in their annual encampments, and, as they gather around the campfires, talk of days ago, and sing the old war songs. Each succeeding year the ranks are depleted by absentees summoned to join their comrades gone before. But, conscious of the faithful and heroic military service they rendered, they have not become discouraged by delay, and still cherish fond hopes that the Government will yet do them justice by granting to them fitting and fair reward and bounty. They prize this recognition of their honorable service as a rich legacy for their descendants far more than the actual benefits they will receive during their few remaining years.

Under the authority of a special State commission, an enrollment has been made of all the survivors of the various Indian conflicts in Utah in which the service rendered has been classified and duly

authenticated both by record evidence and competent living witnesses. In 1911 the State appropriated the sum of \$50,000 as a measure of relief and partial compensation to these aged veterans, and doubtless further consideration will be shown them in the future.

I have drawn H. R. 2445, I believe, broad enough to meet the conditions under which the service was rendered, so as to enable those survivors only who are entitled to draw pensions. Any provision requiring proof of enlistment or muster in or compensation from the United States would effectually close the door to those whom I desire to benefit. I fear that any provision leaving to the Secretary of the Interior the discretion, unless clearly defined, to determine the evidence upon which a pension claim could be established would only prove a further illusion and disappointment to the dim eyes and hoary heads who have trustingly waited for relief so long.

I hope the committee will report a bill that will be not only generous and liberal in its bounty, but broad enough in its provisions as to proof of service to enable every worthy survivor to share in its benefits. Forty-five to fifty years have elapsed since most of these conflicts were waged. Few of the veterans of the theater of action during those strenuous times are left with us. To bestow the relief we ask for them would not perceptibly affect our national revenues. It will not be for long. The immutable Harvester is busy even now gathering the remnants to their final home.



INTERNATIONAL CONGRESS OF MUSICAL SCIENCE AND
HISTORY.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

INVITATION TO PARTICIPATE IN INTERNATIONAL CONGRESS OF
MUSICAL SCIENCE AND HISTORY TO BE HELD IN PARIS, JUNE,
1914, ALSO LETTER FROM THE LIBRARIAN OF CONGRESS SHOW-
ING FAVOR WITH WHICH HE VIEWS THE PROPOSED GATHERING.

MAY 16, 1914.—Message and papers referred to the Committee on Foreign Affairs and
ordered to be printed.

To the Senate and House of Representatives:

In view of a provision contained in the deficiency act approved March 4, 1913, that "thereafter the Executive shall not extend or accept any invitation to participate in any international congress, conference, or like event without first having specific authority of law," I transmit herewith for the consideration of the Congress and for its determination whether it will authorize the acceptance of the invitation a report from the Secretary of State, with accompanying papers, being an invitation from the Government of the French Republic to that of the United States to send delegates to an international congress of musical science and history to be held at Paris in June next, and a letter from the Librarian of Congress showing the favor with which he views the proposed gathering.

It will be observed that the acceptance of this invitation involves no appropriation of public moneys.

WOODROW WILSON.

THE WHITE HOUSE,
Washington, May 16, 1914.

The PRESIDENT:

On April 28, 1914, the ambassador of the French Republic at this Capital, acting under instructions from his Government, conveyed to the Government of the United States an invitation to be represented by official delegates at the congress of musical science and history to be held at Paris in June, 1914.

This invitation was communicated to the Librarian of Congress, who, in a letter dated May 9, 1914, expresses the hope that a recommendation will be made to Congress for authority to appoint delegates on the part of the United States to this Congress, provided that such representation shall not involve any expense to this Government.

The Executive being prohibited by a provision of the deficiency act approved March 4, 1913, from accepting an invitation of this nature without specific authority of law, I have the honor to submit the papers herewith to the end that should you approve they may be transmitted to Congress for that body to determine whether it will authorize the acceptance of the invitation.

Respectfully submitted.

W. J. BRYAN.

DEPARTMENT OF STATE,

Washington, May 13, 1914.

[Translation.]

EMBASSY OF THE FRENCH REPUBLIC,

Washington, April 28, 1914.

MR. SECRETARY OF STATE: I have the honor to inform your excellency that the International Society of Music is organizing for the month of June next at Paris a congress of musical science and history which will be in continuation of the meetings that were held under its management of late years at Leipzig, Basle, Vienna, and London.

As the Federal Government sent official delegates to the congresses of the above-named society at Vienna in 1909 and in London in 1911, I am instructed by my Government to forward and commend to your favorable examination the inclosed invitation.

Be pleased to accept, Mr. Secretary of State, the assurances of my high consideration.

JUSSERAND.

Hon. W. J. BRYAN,

Secretary of State of the United States.

[Honorary president, Henry Roujon; president, Louis Barthou; vice presidents, H. Deutsch de la Meurthe, J. Ecorcheville, Prof. Carliel; secretary general, J. Chantavoine; assistant secretary, A. Gadave.]

INTERNATIONAL SOCIETY OF MUSIC,

SECTION OF PARIS,

Congress of Paris, 1914.

EXCELLENCY: You have been pleased to send an official delegate of your Government to every one of the last congresses of our society, at Vienna in 1909 and at London in 1911.

We now wish, with the assistance of the French Government, to ask you to be pleased to designate to the forthcoming congress of musical history and science, that will be held under the auspices of our society from the 1st to the 10th of June next at Paris, a scientist of your country whom you may deem fitted to discharge that high office.

We beg your excellency to accept with our thanks the expression of our most respectful devotion.

One of the presidents:

J. EECORCHEVILLE.

THE MINISTER OF PUBLIC INSTRUCTION OF THE UNITED STATES.

LIBRARY OF CONGRESS,
Washington, May 9, 1914.

MY DEAR MR. LANSING: Your note of May 5 is before me with reference to the invitation to the Government of the United States to be represented at the congress of musical science and history to be held at Paris in June next.

Obviously, a resolution of Congress is desirable and in several recent cases such a resolution has been passed without hesitation. I suppose that if sought by the State Department, it would be in this case.

I hope therefore that the department will recommend to Congress the passage of such a resolution authorizing the Executive to accredit delegates to the congress, provided that such representation shall not involve any expense to the Government. Prompt action is, of course, indispensable.

In case of the authorization, there are two obviously fitting delegates: (1) Mr. O. G. T. Sonneck, Chief of the Division of Music of the Library of Congress, and (2) Prof. A. A. Stanley, head of the department of music in the University of Michigan. Under a resolution adopted by the American Section of the International Music Society at its meeting at Cincinnati last December, Prof. Stanley was designated as the choice of this section, in case of a participation by our Government which might include a representative of the society. Within a few days I will send you a copy of this resolution.

I assume that the resolution in Congress need not and should not name the delegates proposed.

Faithfully, yours,

HERBERT PUTNAM.

ROBERT LANSING, Esq.,
Counselor Department of State.



INTERNATIONAL CONGRESS ON NEUROLOGY, PSYCHIATRY, AND PSYCHOLOGY, BERNE, SWITZERLAND.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING,

WITH A COMMUNICATION FROM THE SECRETARY OF STATE, COPY OF A LETTER FROM THE MINISTER OF SWITZERLAND CONVEYING AN INVITATION TO THE UNITED STATES GOVERNMENT TO SEND DELEGATES TO AN INTERNATIONAL CONGRESS ON NEUROLOGY, PSYCHIATRY, AND PSYCHOLOGY, TO BE HELD AT BERNE, SWITZERLAND, SEPTEMBER 7 TO 12, 1914.

MAY 26, 1914.—Message and accompanying papers referred to the Committee on Foreign Affairs and ordered to be printed.

To the Senate and House of Representatives:

In view of a provision contained in the deficiency act of March 4, 1913, that "Hereafter the Executive shall not extend or accept any invitation to participate in any international congress, conference, or like event without first having specific authority of law," I transmit herewith for the consideration of the Congress and for its determination whether it will authorize the acceptance of the invitation and the appropriation necessary to defray the expenses incident thereto, a report from the Secretary of State, with accompanying papers, being an invitation from the Government of Switzerland to that of the United States to send delegates to an international congress on neurology, psychiatry, and psychology, to be held at Berne, Switzerland, from September 7 to September 12, 1914, and a letter from the Department of the Interior showing the views of that department with regard to the proposed congress and recommending an appropriation of not to exceed \$500 to defray the expenses of participation by the Government of the United States.

WOODROW WILSON.

THE WHITE HOUSE, May 26, 1914.

To the **PRESIDENT**:

On April 9, 1914, the minister of Switzerland at this capital, acting under instructions from his Government, conveyed to the Government of the United States an invitation to be represented by delegates at the international congress of neurology, psychiatry, and psychology to be held at Berne, Switzerland, from September 7 to September 12, 1914. This invitation with its accompanying inclosure was communicated to the Secretary of the Interior who, in a letter dated May 12, 1914, transmitted to the department the views of the superintendent of the Government Hospital for the Insane as to the desirability of the Government of the United States being represented in the Congress and suggesting an appropriation of \$500 to cover the expenses of a delegate. The Executive being prohibited by a provision of the deficiency act approved March 4, 1913, from accepting any invitation of this nature without specific authority of law, I have the honor to submit the papers herewith to the end that should you approve, they may be transmitted the Congress for that body to determine whether it will authorize the acceptance of the invitation and will provide the appropriation which the Secretary of the Interior thinks will be required for a United States representative in this international congress.

Respectfully submitted.

W. J. BRYAN.

DEPARTMENT OF STATE,
Washington, May 21, 1914

[Translation.]

LEGATION OF SWITZERLAND,
Washington, D. C., April 9, 1914.

Mr. MINISTER: The Swiss Society of Neurology has decided to organize, in conjunction with the Society of Swiss Psychiatrists, a congress on neurology, psychiatry, and psychology.

The congress, which will be held at Berne from the 7th to the 12th of September next, will be opened by the president of the Swiss Confederation, who has accepted to be its president of honor.

The congress is intended to bring forth as complete a showing as possible of the progress thus far achieved in the study of the nervous system, viewed in its most general acceptation. It will therefore be most important from the scientific and social standpoints, and the supreme federal council would attach great value to the United States Government being represented at the congress, which, it is now expected, will be attended by from 600 to 800 physicians and scientists, by official delegates.

I am instructed and have the honor to extend that invitation to your excellency, and should be greatly obliged to you if you would kindly inform me at the earliest possible date whether the United States Government accepts the invitation, and if so, of the names of the delegates.

Be pleased to accept, etc.,

P. RITTER,
Minister of Switzerland.

His excellency Mr. WILLIAM JENNINGS BRYAN,
Secretary of State.

May 26

DEPARTMENT OF THE INTERIOR,
Washington, May 12, 1914.

The honorable the SECRETARY OF STATE.

SIR: Your letter of May 5, 1914, has been received, inclosing copy of a note from the minister of Switzerland at this capital conveying to this Government an invitation to be represented by official delegates at the international congress on neurology, psychiatry, and psychology to be held at Berne, Switzerland, September 7 to 13, 1914. You inquire as to whether this department deems the congress of sufficient importance to warrant application to Congress for authority to accept the invitation; and if so, the amount of appropriation that is desired.

In response thereto I transmit copy of a report on the matter from the superintendent of the Government Hospital for the Insane, to whom your inquiry was referred, expressing his views as to the desirability of the United States being represented at said congress and suggesting that \$500 would probably cover all expenses of each delegate that may be sent from this country to Berne.

In view of the statements made by the superintendent of the Government Hospital for the Insane, I have to suggest the advisability of bringing the matter of sending official delegates from this country to the international congress at Berne to the attention of Congress.

Respectfully,

LEWIS C. LAYLIN,
Assistant Secretary.

DEPARTMENT OF THE INTERIOR,
GOVERNMENT HOSPITAL FOR THE INSANE,
Washington, D. C., May 11, 1914.

The honorable the SECRETARY OF THE INTERIOR,
Department of the Interior, Washington, D. C.

SIR: I have the honor to acknowledge, by department reference, a letter from the counselor of the State Department, inclosing an invitation from the minister of Switzerland to the Government of the United States to be represented by official delegates at the international congress of neurology, psychiatry, and psychology to be held at Berne from September 7 to 13 next. You invite my attention to this correspondence and ask for my consideration and report upon same, with return of papers.

With regard to the general importance of this congress I may say that all of us who are interested in the progress of the subjects it represents believe it to be of very great importance. The congress has been extensively organized and practically every civilized country has considerable committees preparing for their several parts that they are to take in the final assemblage. The program of the proceedings, copy of which was inclosed with the minister's letter, contains the names of many of the foremost investigators in the world. This congress will undoubtedly be largely attended, and I have also little doubt but that every one of the larger powers, and perhaps many of the smaller ones, will send official delegates. Personally, I should feel that it would be too bad if the United States did not respond in like manner.

I had the honor, myself, to attend a previous meeting of this congress in Amsterdam. It was very largely attended, and the whole matter was thought of sufficient importance so that the Queen was present in person at the opening exercises, at which the minister of state made an address. At the close of this address the Queen herself received in person the members of the congress. I cite this instance merely to indicate to you the standing which this particular scientific body has in Europe.

I take it from the reference to law made by the counselor of the State Department that some statute has been passed of recent date. If that is the case, and the expenses of any delegates appointed by the Government to attend this Congress could be paid, the only expense, of course, would be the actual traveling expenses and the living expenses while in Berne for approximately five days. If all the traveling expenses were paid, I think the usual allowance of \$5 per day for living expenses would meet the necessary requirements, and the last time that I was abroad I learned that the allowance by the English Government is a pound per day for expenses. This would make the amount of appropriation which had to be asked to depend entirely upon the number of delegates that it might be desired to attend. Four hundred dollars, I should say, would about cover the expense of a delegate from this country to Berne, attendance upon the congress, and return. Five hundred dollars, I think, would be an ample amount.

Trusting that I have covered the several matters about which information is desired, I remain,

Respectfully,

WM. A. WHITE, *Superintendent.*



SIXTH INTERNATIONAL DENTAL CONGRESS.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING,

WITH A COMMUNICATION FROM THE SECRETARY OF STATE, COPY OF A LETTER FROM AMBASSADOR CECIL SPRING-RICE CONVEYING AN INVITATION TO THE UNITED STATES GOVERNMENT TO PARTICIPATE IN THE SIXTH INTERNATIONAL DENTAL CONGRESS TO BE HELD AT LONDON, AUGUST 3 TO 8, 1914.

MAY 26, 1914.—Message and accompanying papers referred to Committee on Foreign Affairs and ordered to be printed.

To the Senate and House of Representatives:

In view of a provision contained in the deficiency act approved March 4, 1913, that "Hereafter the Executive shall not extend or accept any invitation to participate in any international congress, conference, or like event without first having specific authority of law," I transmit herewith for the consideration of the Congress and for its determination whether it will authorize the acceptance of the invitation a report from the Secretary of State, with accompanying papers, being an invitation from the British Government to that of the United States to send delegates to the Sixth International Dental Congress, to be held at London, from August 3 to 8, 1914, and a letter from the Department of the Interior showing the favor with which that department views the proposed gathering.

WOODROW WILSON.

THE WHITE HOUSE,
Washington, May 26, 1914.

The PRESIDENT:

On July 16, 1913, the ambassador of Great Britain at this capital, acting under instructions from his Government, conveyed to the

Government of the United States an invitation to be represented by delegates at the Sixth International Dental Congress to be held at London, under the patronage of His Majesty King George V, from August 3 to 8, 1914.

This information was communicated to the interested departments of this Government, and in a letter dated September 19, 1913, the Assistant Secretary of the Interior informed me that the Commissioner of Education is of the opinion that the recognition of the high standard of professional training for dental surgery in the United States and the repeated complaints received from foreign Governments of efforts made by inferior dentists to establish themselves in practice in foreign countries afford good ground for the representation of the United States at the forthcoming international dental congress.

The Executive being precluded by a provision of the deficiency act approved March 4, 1913, from accepting an invitation of this nature without specific authority of law, I have the honor to submit the papers herewith to the end that should you approve they may be transmitted to Congress for that body to determine whether it will authorize the acceptance of the invitation.

Respectfully submitted.

W. J. BRYAN.

DEPARTMENT OF STATE,
Washington, May 13, 1914.

BRITISH EMBASSY,
Dublin, N. H., July 18, 1913.

SIR: I am in receipt of a dispatch from His Majesty's principal secretary of state for foreign affairs, informing me that the Sixth International Dental Congress is to be held in London, under the patronage of His Majesty the King, from the 3d to the 8th of August, 1914, inclusive.

Although the congress is not promoted by His Majesty's Government, they take interest in the objects for which it is being summoned, and would learn with pleasure that the invitation had been accepted.

I have the honor to be, with the highest respect, sir,

Your most obedient humble servant,

CECIL SPRING-RICE.

HON. W. J. BRYAN,
Secretary of State, etc.

DEPARTMENT OF THE INTERIOR,
Washington, September 19, 1913.

The honorable the SECRETARY OF STATE.

SIR: I have the honor to acknowledge the receipt of your letter of the 5th instant, relative to an invitation to this Government to participate in the Sixth International Dental Congress, to be held at London under the patronage of His Majesty the King, from the 3d to the 8th of August, 1914.

In accordance with your request for an opinion as to the advisability of an application to Congress for authority to accept the invitation, a course rendered necessary by the provision of the deficiency act approved March 4, 1913, the Commissioner of Education, to whom the matter was referred, suggests that the high standard of professional training for dental surgery in the United States has been widely recognized, while at the same time foreign nations have repeatedly complained to this country of efforts made by inferior dentists to establish themselves in practice in the said countries. These facts, in the opinion of the commissioner, afford good ground for the representation of the United States at the forthcoming International Dental Congress, and therefore it seems proper and desirable that application should be made to Congress for the sanction of such representation.

I have the honor to be, sir,
Your obedient servant,

LEWIS C. LAYLIN,
Assistant Secretary.

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CONNECTING PARKWAY BETWEEN POTOMAC AND
ZOOLOGICAL PARKS.

L E T T E R

FROM

THE SECRETARY OF THE TREASURY,

SUBMITTING

RESOLUTION RELATIVE TO THE ACQUIREMENT OF LAND AND
PREMISES ALONG ROCK CREEK FOR THE PURPOSE OF CON-
NECTING POTOMAC PARK WITH THE ZOOLOGICAL PARK AND
ROCK CREEK PARK, AS AUTHORIZED BY ACT OF CONGRESS
APPROVED MARCH 4, 1913.

MAY 26, 1914.—Referred to the Committee on Public Buildings and Grounds and
ordered to be printed.

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, May 29, 1914.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES,
Washington, D. C.

SIR: By act of Congress approved March 4, 1913 (37 Stats. L., p. 885), the acquirement, by purchase, condemnation, or otherwise, of land and premises lying on both sides of Rock Creek, including such portion of the creek bed as may be in private ownership, was authorized at a cost not to exceed \$1,300,000, and a commission consisting of the Secretary of the Treasury, the Secretary of War, and the Secretary of Agriculture was constituted to conduct the operations incident to the acquisition.

The main intent of this act was to acquire, for park purposes, a strip of land connecting Potomac Park with the Zoological Park and Rock Creek Park, utilizing therefor land not valuable for buildings or for commercial purposes. The nature of this land has for many years prevented the development of an important part of the city, and the land itself is mainly valuable for the purposes for which it is now desired. The act requires that the limits of this strip shall be

within the taking lines shown on the map on file in the office of the Engineer Commissioner of the District of Columbia, dated May 17, 1911. This map was drawn to a small scale, was not based on accurate surveys, and the lines were placed apparently without special study of local conditions. Since the passage of the act the strip has been surveyed by the surveyor of the District of Columbia and an accurate map obtained showing property holdings and their dimensions. Since this survey was completed the subject has been given further study by experienced engineers and a number of difficulties have been discovered which would be likely to delay unreasonably, if not prevent altogether, the execution of the law as originally passed.

From this survey it appears that the lines established in the act as taking lines will, if rigidly adhered to according to the law, cost the Government much more than is necessary for the purposes of the act, and there is serious question as to whether acquirement by condemnation proceedings can be accomplished in some instances without much litigation, if at all.

It will be seen that the taking lines provide for the acquisition of the mouth of the Chesapeake & Ohio Canal, which is operated as a public utility under contractual relations with the United States. The owners maintain that condemnation proceedings by the United States against them for the possession of their canal mouth would be ineffective. In any event, if possession of all the area within the taking lines should be required as called for by the act, it would include the mouth of the canal and therefore make it necessary for the canal company to secure a new outlet outside of the taking lines, which could be done only at great cost—perhaps in excess of the total amount authorized. It is believed, however, that the canal company would not object to agreeing on some new location for their canal outlet within the taking lines, which would be equally useful to them and would not materially interfere with the proposed parkway. Such an agreement could probably be made for a fraction of the cost of condemnation along the lines required by the act.

In a similar way the portion of the property of the Washington Gas Light Co. which is involved, if obtained by condemnation, would cost a very large sum, owing to the existence of a great number of mains under the surface and certain of their buildings and plant above ground, as well as the water-front rights. It is maintained that much of their property is on ground owned by the United States, but without authority, and suits are now contemplated to settle this question of ownership. Should the claims of the United States be established, as is probable, agreements could undoubtedly be made with the gas company by which right of way for park purposes can be secured without much, if any, expense. Condemnation in this case also would be inexpedient.

Attention is also invited to a large number of lots between M and Q Streets, which are crossed diagonally by the taking lines, making it necessary to purchase, in some cases, a small portion of a lot, which, if the usual experience in condemnation is had, will cost as much as the entire lot, the Government paying the full price therefor and acquiring possession of only a portion. For the sake of economy it would be much better in these cases to have the taking lines conform to property or lot lines as far as practical.

Furthermore, the physical connection between the mouth of Rock Creek and Potomac Park was not sufficiently included in the taking lines as mentioned in the act, and proper provision should be made for this connection, as otherwise the purposes of the act will not be accomplished. Again, in some instances more land will be required to enable roads to be constructed, while less land than is designated will be needed in other cases. The total area of land to be acquired under the proposed modifications will probably be less than that included in the map referred to in the act.

For all these reasons some latitude and discretion should be granted the commission in the acquisition of land and in the method of obtaining possession which will enable them to utilize the means which are most economical to the United States.

Approximate estimates show that the cost of acquiring this land will probably be greatly in excess of the amount authorized, possibly amounting to twice as much, for which provision has not been made specifically in the act. It may have been the intention of Congress that the provisions of the act of June 26, 1912 (37 Stat. L., p. 178), relative to the assessment of benefits, should be applied in the acquisition of this land, but no explicit mention of this purpose was made in the first legislation, and therefore none is included in the suggested amendment. It is the opinion of the commission that the provisions of the act of June 26, 1912, relative to the assessment of benefits should be applied to the acquisition of this land.

By act of Congress approved July 1, 1898 (30 Stats. L., ch. 543), the park system of the District of Columbia was placed under the control of the Chief of Engineers, United States Army, and all parks acquired since that date have been added to this system by a provision in each act by which such parks were acquired. During this time a number of park areas have been transferred from the District Commissioners and added to this system. A provision to this effect is therefore included in the present proposed legislation.

The proposed resolution has been prepared with a view to overcoming the difficulties and inexpediencies mentioned above and to supplement the original act to that extent. It has the approval of the Department of Justice.

Respectfully,

W. G. McADOO,
Secretary of the Treasury,
Chairman Rock Creek Valley Parkway Commission.

[Inclosure.]

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the commission created by section 22 of the public buildings act approved March 4, 1913, for the purpose of acquiring land for a connecting parkway between Potomac Park and the Zoological Park shall have power, in its discretion, so to amend the map on file in the office of the engineer commissioner of the District of Columbia, dated May 17, 1911, as to exclude lands not needed and to include lands needed for the execution of a plan for the said parkway approved by the Commission of Fine Arts: *Provided*, That the total area of lands finally to be acquired for said parkway shall not exceed the area authorized to be acquired by said act: *Provided further*, That the said commission is hereby authorized to settle and compromise all questions and controversies between the United States and adverse claimants of titles to lands within or adjacent to the area desired for said parkway, subject to the approval of the Attorney General of the United States, who may, in

4 PARKWAY BETWEEN POTOMAC AND ZOOLOGICAL PARKS.

such settlement and compromise or in any condemnation proceedings requested by said commission, exercise the power in him conferred by sections 363, 364, and 365 of the Revised Statutes of the United States, any provision of law to the contrary notwithstanding. Toward the acquisition of the said lands and for the payment of the expenses incident thereto, the sum of \$75,000 is hereby appropriated out of any money in the Treasury not otherwise appropriated and shall be available until expended: *Provided*, That the said lands when acquired shall be a part of the park system of the District of Columbia, subject to the provisions of section 2 of the act of Congress approved July 1, 1898 (30 Stat., ch. 543).



APPROPRIATION FOR COLLECTION OF SPECIMENS OF
ELK, ETC.

LETTER

FROM

THE ACTING SECRETARY OF THE TREASURY,

TRANSMITTING

COPY OF A COMMUNICATION OF THE ACTING SECRETARY OF THE SMITHSONIAN INSTITUTION, SUBMITTING SUGGESTED PROVISION FOR INCLUSION IN THE SUNDRY CIVIL APPROPRIATION BILL FOR FISCAL YEAR 1915 AUTHORIZING THE SECRETARY OF THE INTERIOR TO PERMIT THE SMITHSONIAN INSTITUTION TO PROCURE FOR THE NATIONAL COLLECTIONS SPECIMENS OF ELK AND OTHER ANIMALS FROM THE NATIONAL PARKS UNDER THE JURISDICTION OF THE SECRETARY OF THE INTERIOR.

JUNE 4, 1914.—Referred to the Committee on Appropriations and ordered to be printed.

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, June 1, 1914.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith, for the consideration of Congress, copy of a communication of the Acting Secretary of the Smithsonian Institution of May 29, 1914, and accompanying papers, submitting a suggested provision for inclusion in the sundry civil appropriation bill for the fiscal year 1915 authorizing the Secretary of the Interior to permit the Smithsonian Institution to procure for the national collections specimens of elk and other animals from the national parks under the jurisdiction of the Secretary of the Interior.

Respectfully,

CHARLES S. HAMLIN, *Acting Secretary.*

SMITHSONIAN INSTITUTION,
Washington, May 29, 1914.

SIR: I beg leave to transmit herewith an item authorizing the Secretary of the Interior to permit the Smithsonian Institution to procure for the national collections specimens of elk and other animals from the Yellowstone and other national parks under his jurisdiction, and to ask that you will have the goodness to transmit it to the House of Representatives for inclusion, if possible, in the sundry civil bill soon to be reported.

I inclose for your information and that of the House a copy of my letter to the Secretary of the Interior under date of May 23, 1914, and of the reply, dated May 27, 1914, which explain the necessity for this provision.

Very respectfully, yours,

R. RATHBUN, *Acting Secretary.*

The SECRETARY OF THE TREASURY,
Washington, D. C.

[Suggested provision to be inserted in sundry civil bill for the fiscal year ending June 30, 1915.]

Provided, That the Secretary of the Interior be, and is hereby, authorized to permit the Smithsonian Institution to procure for the national collections in Washington, at such times as they are needed, elk and other animals from the Yellowstone and other national parks under his jurisdiction, subject to such regulations as he deems necessary.

SMITHSONIAN INSTITUTION,
Washington, May 23, 1914.

DEAR MR. SECRETARY: Referring to my letter of May 5 and our recent conference relative to procuring some elk from the Yellowstone National Park for the United States National Museum, I beg to submit herewith for your consideration a proposed resolution, which, if approved by Congress, would authorize the Secretary of the Interior to permit the Smithsonian Institution to collect from the national parks under his jurisdiction elk and other animals for the national collections in Washington, subject to the regulations of the Department of the Interior.

Very respectfully, yours,

C. D. WALCOTT, *Secretary.*

The SECRETARY OF THE INTERIOR,
Washington, D. C.

[Inclosure.]

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior be, and is hereby, authorized to permit the Smithsonian Institution to procure for the national collections in Washington, at such times as they are needed, elk and other animals from the Yellowstone and other national parks under his jurisdiction, subject to such regulations as he deems necessary.

DEPARTMENT OF THE INTERIOR,
Washington, May 27, 1914.

Hon. C. D. WALCOTT,
Secretary Smithsonian Institution,
Washington, D. C.

MY DEAR MR. WALCOTT: I am in receipt of your communication of May 23, 1914, transmitting a proposed joint resolution, as follows:

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior be, and is hereby, authorized to permit the Smithsonian Institution to procure for the national collections in Washington, at such times as they are needed, elk and other animals from the Yellowstone and other national parks under his jurisdiction, subject to such regulations as he deems necessary.

In reply, I have to say that the department has no objection to the enactment of said resolution into law, and, in fact, is favorable to such action.

Very respectfully,

LEWIS C. LAYLIN,
Assistant Secretary.

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NINTH ANNUAL REPORT
OF THE
AMERICAN NATIONAL
RED CROSS

LETTER FROM
THE SECRETARY OF WAR

TRANSMITTING

NINTH ANNUAL REPORT OF THE AMERICAN NATIONAL
RED CROSS, SHOWING RECEIPTS AND EXPENDITURES
DURING THE PERIOD JANUARY 1
TO DECEMBER 31

1913



JUNE 10, 1914.—Referred to the Committee on Interstate and Foreign Commerce
and ordered to be printed

WASHINGTON

1914



LETTER OF TRANSMITTAL.

WAR DEPARTMENT,
Washington, June 8, 1914.

SIR: I have the honor to transmit herewith the ninth annual report of the American National Red Cross, made pursuant to the provision of the act of Congress approved January 5, 1905 (33 Stats., p. 599), entitled "An act to incorporate the American National Red Cross," and to state that the receipts and expenditures as shown on the accompanying report of the treasurer of the American National Red Cross, covering the period from January 1, 1913, to December 31, 1913, have been audited and found correct.

Very respectfully,

LINDLEY M. GARRISON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

NINTH ANNUAL REPORT OF THE AMERICAN NATIONAL RED CROSS.

REPORT OF THE CENTRAL COMMITTEE.

By Maj. Gen. GEORGE W. DAVIS, United States Army (Retired), Chairman.

The ninth year of Red Cross operations has been one of very considerable activity, not only in respect of the relief of suffering but as well in the working out of improvements of the Red Cross methods that look to greater efficiency. It has seemed to me fitting, therefore, that there be explained to the general board what are the characteristic features of the organization that has been evolved from the nucleus or fragments of one that existed when in 1905 Congress conferred upon the incorporators the power to organize in America a national society that should perform the duties the United States assumed when our Government on March 1, 1882, adhered to the Geneva treaty of August 22, 1864.

THE INCORPORATORS.

The act of Congress approved January 5, 1905, declared that the 60 persons named in the act and their successors and associates were a corporation with all the usual powers exercised by corporate bodies in the District of Columbia, including the power to ordain and establish by-laws and regulations. In pursuance with the by-laws enacted December 7, 1909, this corporate body has been styled "The general board," in which are lodged all general powers of government and control. The associate members of this board recognized in the congressional act consist of five appointed by the President, of members of administrative boards, and of committees and delegates from subordinate bodies.

The general board is now constituted as follows:

Incorporators and their successors.....	60
Incorporators named by the President.....	5
Members of central committee.....	18
Members of administrative boards.....	45
Delegates of chapters.....	60
Delegates of State boards.....	50
Delegates of institutional members.....	18
Delegates of State nursing organizations.....	36
Total incorporators and associates.....	292

The general board has recognized the officers of the Red Cross as follows:

The president, the vice president, the treasurer, the secretary, the counselor—all chosen annually by the general board.

The office of national director was created by the general board and was filled by the president of the Red Cross on the recommendation of the central committee, but for no specific term of office.

The central committee is styled by the charter "The governing body of the Red Cross," and is thus constituted:

Members appointed by the President for one year (one of whom is designated as chairman).....	6
Members appointed by the incorporators for three years.....	6
Members appointed by the State organizations for three years.....	6
Total.....	18

The terms of incumbency of the second and third classes are so arranged that there are two vacancies in each group each year.

The central committee is empowered to appoint annually from its own members an executive committee of seven members to exercise all the powers of the central committee when the latter is not in session. This committee is required to meet at least four times a year. The by-laws require that the chairman of the central committee shall also be the chairman of the executive committee.

The general board has segregated into branches or departments all the relief work devolved upon the Red Cross by section 3 of the act of incorporation, and assigned such work for study, plan, organization, supervision, and control as directed by the central committee to the board of war relief, for the work in the United States devolved on the Red Cross by paragraphs 1 and 4, section 3, act of incorporation; to the board of national relief, for the work in the United States devolved on the Red Cross by paragraph 5, section 3, of the act of incorporation; to the board of international relief, for the work in foreign countries devolved on the Red Cross by paragraphs 4 and 5, section —, act of incorporation.

These boards act in an advisory capacity to the central committee. They have no spending power save as authorized by the said committee, the chairman of which is a member ex officio of each board, which consists of a chairman and vice chairman selected by the president of the Red Cross from the central committee, for one year, and 12 other members selected for their experience and efficiency by the president for terms of three years.

SUBORDINATE COMMITTEES.

The war relief board has appointed a national committee on nursing of 15 members, without limitation as to terms of service, the chairman and two other members to be members of the war relief board, one an Army surgeon, one a Navy surgeon, and one other member, all from the same board, six members to be appointed from a list of trained nurses submitted by the American Nurses Association, three other persons appointed on recommendation of the war relief board, all by the chairman of the same board.

The principal duties of this committee are to register, train, and instruct volunteer nurses; to organize and mobilize nurses for active service; to detail nurses for active duty with the Army and Navy; to supervise enrolled nurses when employed.

It is their duty to establish local nursing committees where such may be needed, to instruct the committees in regard to the selection of nurses, and report to the war relief board.

Each of these local committees consists of from five to ten members, who are trained nurses and are appointed annually by the national committee on nursing.

A branch of the work of the national committee on nursing is to organize classes for instruction in family hygiene and home care of the sick.

At the same time there are 30 State and 110 local nursing committees.

The war relief board has also appointed a committee on first-aid instructions, which consists of 16 members appointed by the chairman of the war relief board without limitation as to term of service. The members are selected from among those interested in ways and means for instructing industrial employees in measures for protection against injuries, and first aid for those injured. Instruction is given principally by specially selected physicians and surgeons, who visit the industrial, mining, and logging centers in railway cars specially fitted for practical demonstration.

The national relief board has appointed a committee on town and country nursing, to furnish nurses for the smaller towns and country neighborhoods. It was created by the national relief board, with power to enlarge itself. At present about 20 nurses are in service of this character. The superintendent, an employee of the town and country nursing service committee, reports through her committee to the national relief board.

The charter requires that State and Territorial branches of the National Red Cross be organized throughout the country. These consist of State boards and chapters.

Such boards have been organized in the District of Columbia and in all the States save Pennsylvania. There are also insular boards in Porto Rico and the Philippines, 50 in all. Each board consists of the governor, president ex officio; and 3 more, but not to exceed 10, citizens of the State. There is a vice president and treasurer, each appointed annually by the central committee, as also are the other members of the boards.

Their principal duties are, to advise with the national officers on the occurrence of a disaster; to make appeals for funds; to receive and report receipt of relief funds.

Of chapters there are 60 in all, with an active membership of 9,147 who pay annual dues. Other members who are not residents of the localities where chapters exist are "members at large" of the Red Cross.

The officers of a chapter consist of a chairman, vice chairman, secretary and treasurer, and such others as the chapter may desire. The officers are elected for one year at the annual meetings. Each chapter has an executive committee, consisting of the chairman and secretary, ex officio, and three other elected members.

The principal duties of a chapter are, to respond to calls for contributions issued by the central committee and the State board; to forward contributions received to the central committee; to take prompt relief action in the case of a local disaster; to build up a strong membership and further other Red Cross activities.

In pursuance of special legislation by Congress the endowment funds of the Red Cross are administered by a board of trustees on endowment, consisting of three United States Treasury officials, and

of six prominent business men or bankers, elected by the incorporators; the terms of three of the latter class expire January 1, 1915, and the other three on January 1, 1917.

The board has entire control of all endowment funds, their investment, etc., the income of which is to be used only for general expenses.

SALARIES.

The incorporators and members of committees and boards receive no compensation for their services. The only salaried officers are the secretary, the national director, and the superintendent of the town and country nursing service, who give all their time to the Red Cross.

Membership of the Red Cross Dec. 1, 1913.

Honorary members.....	2
Life members.....	1,300
Sustaining members.....	70
Annual members.....	12,289
Institutional members.....	18
Total.....	13,679

ACTIVITIES.

As on former years, the reports of the three great administrative boards will this year contain much information respecting the activity of this organization, and it will therefore be unnecessary for me to mention details in respect of the duties committed to the boards or of their operations.

Not a year passes that experience does not indicate some new field of activity or show that existing means and measures require change or readjustment. No doubt this condition will continue, and year by year the functioning of the Red Cross will be modified and extended as experience points out the way.

TERRITORIAL RED CROSS DIVISIONS.

So numerous are the calls upon the national director for attention to relief work in widely separated localities and so urgent are the reasons why the local chapters should be strengthened and many new ones organized—work that for success requires the attention of specially trained agents, who are not now available—the committee has felt that the time is near at hand for authorizing the employment of assistants to the national director for the purposes stated. It is proposed to have a general agent or social directors of Red Cross activities in each of the four great geographical regions into which the country may be segregated—the Atlantic, the Mississippi, the Mountain, and the Pacific divisions. A special yearly contribution of \$5,000 toward the expenses of these new agencies has been made by Mr. Cleveland H. Dodge, of New York.

RELIEF OPERATIONS.

With respect to relief work the year has been one of exceptional activity. The following is a list of the places and dates of emergencies that required Red Cross relief:

National relief:

Alum Chine explosion, March 7.
Alabama storm, March 21.
Omaha tornado, March 23.
Ohio Valley floods, March 24.
Finleyville mine explosion, April 23.
Seward, Nebr., May 14.
Fire at Hot Springs, Ark., September 5.
Storm and fire, Nome, Alaska, October 5.
Measles epidemic, Alaska, November 11.
Volturno disaster, October 9.
Mine disaster, Dawson, N. Mex., October 22.
Texas floods, December 1.

International relief:

Balkan War, January 1 (continuation).
Second Balkan War, July 2.
Repatriation Americans in Mexico, January 1 (continuation).
River conservancy in China, January 1 (continuation).
Mexican wounded, Juarez, November 25.
War relief: Gettysburg reunion, July 4.

FIRST-AID INSTRUCTION.

This branch of our activity has been conducted during the year to the entire satisfaction of the central committee, and apparently to the satisfaction of the employers of labor. In the mills, mines, and on the railways many thousands of industrial workers have been taught first aid. A car to replace the first, given by the Pullman Co., which was worn out and no longer safe, was also presented to the Red Cross by the same company.

THE NURSING SERVICE.

This branch of work has been carried on with very great satisfaction. More than 4,000 trained nurses are now enrolled, and during the year several hundred were detailed for service in emergencies.

TOWN AND COUNTRY NURSING.

This work, commenced last year, has been carried forward. There are now employed by local committees over 20 specially trained nurses, furnished by the Red Cross. This branch of activity promises to become very beneficial and popular, and will be largely extended.

HOME NURSING AND HYGIENE.

This has been continued and will be extended as experience points out the best methods of instruction and the necessity for it is recognized by the public.

TUBERCULOSIS WORK.

Another important activity of the Red Cross consists in the raising of funds to aid in the study and prevention of tuberculosis, this

through the printing, distribution, and sale of holiday seals bearing Christmas salutations for affixing on correspondence and on packages by the public, each seal being sold for 1 cent. Since this work was commenced, some five years ago, over \$1,400,000 have been received and the net proceeds applied by the local societies for the study and prevention of tuberculosis.

THE ENDOWMENT FUND.

This remains without material change in amount as at the close of last year. It now yields an income of about \$35,000 yearly, which becomes available for the general expenses of the organization. Efforts are constantly directed toward its increase, so that there may be an annual income adequate to meet the numerous calls upon the society for many minor disasters for which the public do not usually tender means for furnishing relief, although the suffering, while not affecting many, is just as acute and the need of outside relief just as urgent as in the case of the great disasters for which funds are always adequate.

ENDOWMENT FOR TOWN AND COUNTRY NURSING.

This fund, amounting to \$100,000, through the generosity of Mr. Jacob H. Schiff, of New York, has just been established by the donation for this purpose of mortgage bonds that will yield to this branch of Red Cross activity upward of \$5,000 annually, a sum that will be supplemented year by year by a contribution of \$2,000 made by Mrs. Whitelaw Reid, of New York.

NINTH INTERNATIONAL RED CROSS CONFERENCE.

The total net outlay of the Red Cross for this meeting accruing last year was \$9,889.01, and the Government expenditure for the same was \$20,000.

THE BUDGET.

The committee prepared at the close of the last fiscal year a statement of estimated receipts and expenditures for all administrative purposes, including the printing of 100,000,000 Red Cross seals with advertising matter, and the carrying on of the purchase and sale of Red Cross supplies. The expected receipts were \$97,400 and the disbursements \$94,581. The treasurer's accounts for the 10 months ending with October 31, 1913, show that our operations have been carried on within the allotted amounts.

It is proposed to continue this practice of having a yearly budget for administrative receipts and expenditures.

THE NEW YORK OFFICE.

It has been found necessary to maintain a branch Red Cross office in New York, but the expense is a nominal one since the Russell Sage Foundation has placed a room for office purposes at our disposal

DATE OF ANNUAL MEETING.

By the act of Congress approved December 10, 1912, the date of the annual meeting of the Red Cross was changed so as to authorize it in the future on the Wednesday preceding the second Thursday in the month of December.

MISUSE OF OUR INSIGNIA.

In a considerable number of cases organizations, corporations, and individuals, having the law applicable brought to their attention, have willingly desisted from the use of the symbol of the Red Cross, which they had adopted. In the first category are the American Medical Association, the National Association of Retail Druggists, the American Hospital Association, the American Society of Plumbing Inspectors, and the National Society of Funeral Directors.

There are a few commercial houses and individuals who registered the Red Cross as a trade-mark before the 5th of January, 1905. The statutes applicable permit the continued use of this symbol in their business, and owners of the trade-mark have expressed their refusal to give up the legal right they now enjoy, and the Red Cross is powerless to constrain them. It is the policy of the committee to appeal to those who have made an improper use of the cross to relinquish its use, such renunciation based upon our right to invoke legal prosecution. If they do not recognize the public sentiment which undoubtedly concedes the exclusive use of this emblem to the organization named by statute as the one which has no selfish or commercial purpose to serve, but devotes its efforts exclusively to the cause of suffering humanity, then the cases are referred to the Department of Justice with request that criminal prosecutions be instituted.

THE PRESIDENCY.

The first president of the Red Cross after its reorganization in 1905 was the Hon. William Howard Taft, who was then the Secretary of War in the Cabinet of President Roosevelt. Mr. Taft was elected and assumed the duties of the office on February 8, 1905. After he became President of the United States, March 4, 1909, he consented to continue in office, and he was annually reelected.

At the close of his presidential term President Taft tendered his resignation. The central committee considered that the precedent established of having the Chief Executive of the Nation president of the Red Cross ought to be followed, an opinion in which Mr. Taft concurred. His resignation was duly accepted by the committee, and the vacancy thus created was filled by the committee for the unexpired term by the designation to the presidential chair of Hon. Woodrow Wilson, President of the United States, his consent to hold this position having previously been kindly accorded.

The letter of resignation by President Taft follows:

AUGUSTA, GA., *March 19, 1913.*

MY DEAR MR. DE FOREST: I was elected president of the Red Cross in December to succeed myself. I had been president for four years during my incumbency as President of the United States. The cause which the Red Cross promotes is greatly

aided, I think, by having the President of the United States at its head, and I do not think that it embarrasses the incumbent of the office of President of the Nation to accept the office of the head of the Red Cross. It gives it a standing abroad where its reputation is most useful in enabling it to carry out its high purposes. I accepted the last election with the understanding that when I ceased to be President of the United States I would resign the office, with the hope that President Wilson might be induced to accept it and use the union of the two offices in the same way that I have attempted to use it, for the benefit of the public of the United States and of the world at large.

Wherefore, I hereby resign my position as president of the Red Cross, to take effect upon the acceptance of the same by the executive committee of the Red Cross.

Sincerely, yours,

WILLIAM H. TAFT.

Mr. ROBERT W. DE FOREST,
Vice President The American Red Cross,
30 Broad Street, New York, N. Y.

MEMORIAL TO THE WOMEN OF THE CIVIL WAR.

On the initiation of Mr. James A. Scrymser, of New York, the New York Commandery of the Loyal Legion last year proposed to contribute \$300,000 toward the construction in Washington of a memorial to the loyal women of the Civil War, conditioned on the appropriation by the United States Congress of \$400,000 for the same object, this memorial to take the character of a building which should be the perpetual headquarters of the Red Cross.

For the accomplishment of this purpose bills were introduced into both Houses of the United States Congress. The Senate bill was passed, and the same was favorably reported by committee to the House, but the measure was lost in conference.

These bills in a slightly modified form were introduced in the Senate and House during the first session of the Sixty-third Congress. One was passed without material opposition, and was approved by the President October 22, 1913. This measure assures to the American National Red Cross suitable office accommodations for all time in a splendid marble edifice.

Preliminary steps for carrying into effect the law of Congress have been taken, and the committee hopes that the memorial to the women of the Civil War may be dedicated on the sesquicentennial of the close of the civil conflict of 1861-1865.

NECROLOGY.

This year we have to note the death of one of the charter members of the board of incorporators, Mr. Robert C. Ogden, of New York. It is a source of further regret to have to announce the death of Mr. Adolph Busch, of St. Louis, who has been one of our most generous supporters.

MEDALS.

The central committee has felt that some of those who have rendered valuable Red Cross services should be noticed and recognized by the bestowal of medals, and acting in pursuance of section 37 of

the by-laws we have selected as worthy of this mark of appreciation the following and for the special service stated:

• Flood relief, 1913:

Gov. James M. Cox, Ohio (gold).
 Jacob G. Schmidlapp, Cincinnati, Ohio (silver).
 George W. Lattimer, Columbus, Ohio (silver).
 Edward A. Deeds, Dayton, Ohio (silver).
 Homer H. Johnson, Cleveland, Ohio (silver).
 S. O. Richardson, jr., Toledo, Ohio (silver).
 Mr. W. A. Compton, Pomeroy, Ohio (silver).
 John H. Patterson, Dayton, Ohio (gold).

Balkan War relief:

Maj. Clyde S. Ford, Medical Corps, United States Army (gold).
 Hoffman Philip, Constantinople (gold).
 Mrs. W. W. Rockhill, Constantinople (gold).
 John Bickerhoff Jackson, Bucharest (silver).

Taal volcano relief: Hammon H. Buck, Philippine Islands (silver).

General services:

Maj. Charles Lynch, Medical Corps, United States Army (gold).
 Miss Jane A. Delano (gold).
 Charles L. Magee, Washington, D. C. (gold).
 Francis J. Mulhall, Washington, D. C. (silver).
 Lewis E. Stein, Washington, D. C. (silver).

REPORT OF THE NATIONAL RELIEF BOARD.

By ERNEST P. BICKNELL, National Director.

For most of the recurrent processes of nature it becomes possible to gradually establish a theory of probabilities. For example, it is possible to forecast with approximate accuracy how many deaths will occur in a given population; how many inches of rain will fall in a certain territory, etc. Similarly, experience is enabling the Red Cross to form an approximate idea of the number of disasters which may be expected to demand its relief services each year. We have learned that four or five such occasions may be counted a minimum, within the territory of the United States, with six as perhaps a fair average. Mine disasters usually occur in the spring or fall, floods in the spring, cyclones in the spring, forest fires in the fall. Winter is the season in which the smallest number of calls for Red Cross help may be expected. All this is, of course, approximate and there are enough exceptions to prevent us from preparing for one class of disasters to the exclusion of others at any season.

The year now closing has been an extremely busy one. Beginning in March there ensued a series of disasters unusual in both number and magnitude. Between March 1 and October 15, eight disasters called for Red Cross help, an average of one each month during that period. These disasters, in the order of their occurrence, were as follows:

ALUM CHINE EXPLOSION.

On Friday, March 7, 346 tons of dynamite exploded in the hold of the tramp steamer *Alum Chine*, lying at the dock in Baltimore City Harbor. The number of men killed was 30. Relief operations were in the hands of the Federated Charities of Baltimore, with which the Baltimore chapter of the Red Cross cooperated.

ALABAMA STORM.

On March 21 a severe tornado swept across the southern part of Alabama, causing great damage in the towns of Fulton, Nettleboro, Lower Peach Tree, Black Bend, and Camden. The chief destruction occurred in Lower Peach Tree. Twenty-four persons were killed and 46 injured. The Red Cross called upon its institutional member at Birmingham, Ala., to take necessary action, and it responded by sending Mr. William McGrath to the scene of disaster, where he was given charge of relief operations. The damage to property at Lower Peach Tree and in that vicinity amounted to about \$75,000. One hundred and fifteen buildings were completely demolished. The Red Cross provided a fund of \$5,000, which was advanced from the contingent relief fund without calling upon the public for contributions, and to this was added about \$10,000 contributed by the people of Alabama in response to an appeal by the governor of the State.

OMAHA TORNADO.

On March 23, Omaha, Nebr., and the neighboring town of Ralston were swept by a tornado. Mr. E. T. Lies, representing our Chicago institutional member, and Mr. C. M. Hubbard, representing our St. Louis institutional member, proceeded at once to Omaha under instructions from the national director. The Omaha relief committee at first declined to accept outside assistance, and Mr. Lies and Mr. Hubbard thereupon withdrew. Later the committee reconsidered its action, and requested the Red Cross to help. Mr. Lies then returned to Omaha and conferred with those in charge of organizing and directing relief measures. Several experienced social workers from other localities were called in and gave competent service under the general direction of the Associated Charities of Omaha. The Red Cross contributed \$40,000 toward the relief fund, and under its advice the Association of Commerce of Chicago contributed \$10,000. The Red Cross also paid the salaries and expenses of the experienced social workers called in from other cities. The storm destroyed 650 buildings and damaged 1,129. One hundred and nine lives were lost and 355 persons seriously injured. Two thousand one hundred persons were made homeless. The total property loss has been estimated at \$4,000,000. Expenditures for relief operations amounted to about \$350,000, distributed among about 600 families. In addition to this fund, a loan fund of substantially \$100,000 was subscribed to enable people of small means to reestablish themselves.

In the village of Ralston 33 homes were destroyed or damaged, and the property loss was estimated at \$228,000. A relief fund of \$30,000 was provided for Ralston, of which \$5,000 was contributed by the Red Cross.

The local relief committee of Omaha was composed of many of the substantial business men of the city, and the methods of disbursements and accounting were of a high order of efficiency.

Mr. Charles C. Rosewater, secretary of the Omaha committee, this afternoon will present to this meeting a special report upon this disaster.

THE MARCH FLOOD.

As a result of the unprecedented rainfall in the Ohio River Valley, beginning on March 21, the streams tributary to the Ohio in the States of Ohio and Indiana rose to an unprecedented height, causing great loss of life and tremendous property damage. The flood reached its point of greatest destructiveness on March 24, 25, and 26 in the States of Ohio and Indiana. As the flood waters drained into the Ohio River that stream overflowed its banks, and caused destruction during the next week along both shores, as far as the mouth of the river. The Mississippi was also raised to a high point, with the result that extensive damage was done throughout its course from Cairo to New Orleans. The chief destruction along the Mississippi was in the State of Louisiana. Relief measures during and following this flood will be spoken of later in this report.

FINLEYVILLE MINE DISASTER.

On April 23 an explosion in the Cincinnati mine near Finleyville, Pa., caused the death of 96 miners. The Red Cross called upon its institutional member at Pittsburgh for assistance, and in response Mr. J. Byron Deacon went to the scene of the disaster. The Red Cross forwarded \$2,000 from its contingent fund to be drawn upon by Mr. Deacon as needed. Funds were also contributed from other sources. The Pittsburgh Coal Co., which owned the mine, provided for the immediate needs of the families of the miners who were killed by the explosion. Because of the assistance given by the coal company it was unnecessary to draw upon the relief fund which had been collected and which amounted to a total of about \$2,600, including the contribution from the Red Cross. The United Mine Workers of America appropriated \$10,000 for relief purposes, and notified the Red Cross that this fund would be available for expenditure under the direction of the Red Cross representative at the scene. Later the coal company arranged to provide generously for the families of the miners killed by the explosion, and to this date very small drafts have been made upon the relief fund. Mr. Deacon gave excellent service in centralizing and directing relief operations.

SEWARD (NEBR.) TORNADO.

On May 14 Nebraska was visited by a second tornado, which caused serious damage to the city of Seward, about 50 miles west of Omaha. Mr. Lies, from our Chicago institutional member, went at once to Seward with two experienced relief agents and made a prompt survey of the extent of the disaster and the needs of the population. It was found that 8 persons had been killed and 25 injured, 20 homes destroyed, and many damaged. Fortunately a strong local committee was found to be amply able to meet the demands of the situation, and the Red Cross was not required to take any action beyond the collection of information which served as a basis for the committee's distribution of relief.

THE FIRE AT HOT SPRINGS, ARK.

On Friday, September 5, fire broke out in a closely built-up section of Hot Springs, Ark., and burned several hours before it could be extinguished. Mr. William McGrath, from our Birmingham institutional member, acted promptly upon instructions from Washington and hastened to Hot Springs. Upon request of the Red Cross Mr. Durand Whipple, president of the Associated Charities at Little Rock, also hurried to Hot Springs and made a careful survey of the losses and of the requirements of the situation. The fire covered 103 acres, part of which was a closely built-up section of frame cottages and shanties occupied by negroes. Several large hotels and public buildings were also destroyed. No lives were lost. The total property loss was estimated at \$2,250,000, upon which the insurance amounted to substantially \$1,500,000. The local relief committee at Hot Springs issued an appeal for relief contributions. The Red Cross promptly telegraphed the committee to draw upon it for \$1,000. The total amount of the relief fund finally realized is not now accurately known, but it was about \$22,000. Mr. McGrath was invited to become a member of the relief committee, and his experience was drawn upon in establishing a proper system of records, vouchers, receipts, etc. His services were appreciated by the committee and citizens of Hot Springs.

STORM AND FIRE AT NOME, ALASKA.

This great gold camp within the Arctic Circle on October 5 experienced the fiercest storm in its history. The buildings near the water front were overwhelmed by giant seas, which drove inland and destroyed much property. The next day a fire added to the disaster, destroying much of the stocks of provisions upon which the population was depending for its winter food supply. Fortunately vacant houses were available for those whose homes were lost, and a United States revenue cutter was able to bring back to the States those who wished to come before winter locked the port within impenetrable barriers of ice. The Red Cross contributed \$500 to a relief fund, which was expended by a committee in Nome.

VOLTURNO FIRE.

On October 9, 1913, the steamship *Volturno*, of the Uranium line, was burned at sea. Those on board numbered 657. In response to wireless calls for help rescue ships gathered from all quarters, but a gale was blowing and the sea ran too high to permit the safe launching of boats. Some lives were lost in the fire and others by the swamping of lifeboats. Altogether 136 lives were lost and 521 saved. As in the case of the *Titanic* wreck the Red Cross, acting through its New York institutional member and its New York chapter, took administrative charge of measures of relief necessary for the survivors, who were chiefly immigrants, and through whose loss of relatives and all their little property were left in pitifully helpless and destitute condition.

Mayor Kline, of New York, issued a public appeal for relief contributions and all money received was turned over to Mr. Jacob H.

Schiff, treasurer of the New York chapter. Mr. W. Frank Persons, who had had extensive experience in emergency relief for the Red Cross, was appointed director in charge of relief activities. Survivors were met at the docks as they arrived on the several ships which had rescued them, and were given temporary shelter by the Hebrew Shelter & Immigrant Aid Society, while their needs were ascertained and proper provision made for their future care. One of the most touching and dramatic features of the work was the reuniting of families, whose members had been rescued by different ships and who in many instances believed their relatives dead, only to find them alive and well on arrival in New York.

Relief contributions were disappointing in amount. All told, the fund amounted to but \$11,500, of which \$5,000 was contributed by the American Red Cross from its contingent funds.

MINE DISASTER AT DAWSON, N. MEX.

On October 22 an explosion in a mine of the Stag Canon Fuel Co., at Dawson, N. Mex., killed 265 men. Of those killed, 59 were married. Americans who lost their lives numbered 35, Italians 135, with several nationalities represented among the remainder. The Red Cross immediately offered an initial contribution to a relief fund, acting through Gov. McDonald and our New Mexico board. Mr. S P Morris, of Denver, as a special representative of the Red Cross, also hastened to Dawson and offered his services in organizing relief measures. After conferences, in which Gov. McDonald, the mine company officers, and Mr. Morris participated, the company expressed a readiness to make all necessary provision for both temporary and permanent care of the dependents of those killed in the disaster. The Red Cross offers of assistance were therefore declined, with cordial assurances of appreciation by the company.

EPIDEMIC IN ALASKA.

On November 7 the Secretary of the Interior received an appeal from the governor of Alaska for relief for natives on the islands of Kodiak and Afognak, who were suffering from a fatal epidemic of measles. On November 11 a revenue cutter from Seattle was sent to Alaska with medicines and supplies, toward the purchase of which the Red Cross contributed \$250.

TEXAS FLOODS.

Heavy rains at the end of November and the beginning of December brought on disastrous floods in the Brazos, Colorado, and other rivers in Texas. Waco, San Antonio, Bryan, and other cities and towns suffered severely. The loss of life is reported to have approximated 100. The Red Cross, on December 5, telegraphed Gov. Colquitt its readiness to send an initial contribution of \$1,000 toward a relief fund and to send experienced men to assist in the organization of relief agencies, if desired. Gov. Colquitt, in reply, expressed thanks for the proffer, but voiced the hope that it would prove unnecessary to take advantage of it.

FLOOD RELIEF OPERATIONS.

Flood relief operations are approaching completion. The temporary administrative offices of the Red Cross established in Columbus, Ohio, on March 29 were closed on August 29, after an extremely active existence of five months. The special agents of the Red Cross, who had been assigned to many different communities, have been released, leaving the finishing touches here and there to be given by the local flood relief committees or the permanent local social agencies. From the Washington office the national director is keeping in relations by correspondence with the centers of activity, and making such additional allotments of funds as the circumstances require.

In some communities house reconstruction is not quite complete. Here and there outbreaks of typhoid have prolonged the work of the relief committees and have brought into it serious complications. Then belated and recurrent instances of need arise in every community. A family which fled from home when the flood came has remained with distant friends until now and has not shared in the relief distribution in its home town where its losses occurred. Returning home at this late date, it applies for help. Another family received help which was thought sufficient, but because of illness or poor management, or perhaps because of mistaken judgment by the relief committee, it has become necessary to provide further help.

No great task of relief giving, following a serious disaster, can be cut short off and dismissed from further consideration. The time will come when the Red Cross will have done all that it can; but there must inevitably remain a legacy of special needs which can only be met by the community's own helpful agencies. Therefore, this announcement that the flood relief operations are substantially completed, refers only to the large measures of relief carried on by the Red Cross and the special local committees. Undoubtedly the permanent relief agencies all through the flood district will find their work materially increased during the coming winter as a direct result of the flood.

THE LOSSES.

No one can compute the losses by the flood last spring. The destruction to life can be given with fair accuracy, although not with exactness. About 600 persons were drowned in the entire flood area. Loss of life was greatest in Dayton, Hamilton, and Columbus, with a heavy toll in many other towns. When the relief committees began to inquire as to the deaths of heads of families—the breadwinners—the number was found to be surprisingly small. Chiefly the victims were children and women.

Officers of the United States Weather Bureau stationed at Columbus have gathered such information as is available relative to property losses in the State of Ohio. From this they have ventured upon the following estimates: Buildings and personal property, \$78,072,387; farm lands, buildings, fences, etc., \$5,002,000; farm products, \$1,412,800; live stock, \$234,953; public highways and bridges, \$12,031,039. Here is a total estimate of \$96,753,179 in Ohio alone, and how inadequate a measure it must be of the actual losses becomes apparent

when it is known that it makes no allowance for the enormous losses in wages of scores of thousands of workmen and in the profits of business concerns. Nor can any estimate be made of the economic loss resulting from the illness, the grief, and discouragement of those thousands who endured the anguish of seeing their homes or their loved ones swept away and who passed through terrible exposure during those days of trial.

And what was true of Ohio was equally true, though smaller areas and populations were affected, of Indiana, Illinois, Missouri, Kentucky, and West Virginia. As an illustration of the difficulty of ascertaining the actual flood losses, it may be stated that the United States Geological Survey has estimated the damages caused by the flood at \$200,000,000.

Collected information which is substantially accurate shows that in the days immediately following the flood more than 300,000 persons in the Ohio Valley were compelled to depend upon relief supplies for food. Families driven from home and temporarily dependent upon relief agencies or friends for shelter numbered about 65,000, consisting of about 256,000 persons. The number of dwelling houses completely swept away and destroyed was 2,691, while the houses repaired and put into habitable condition by the aid of relief funds exceeded 10,000 in number. These statistics are exclusive of the losses of life and property and the number of refugees in the lower Mississippi Valley.

RELIEF EXPENDITURES.

Total expenditures of cash by the Red Cross and the several State and local committees aggregate not less than \$3,200,000. Of this amount about \$1,350,000 was contributed through the Red Cross, \$850,000 was contributed expressly to Ohio for use in that State, and was expended through the Red Cross; about \$500,000 was contributed directly to flooded cities and towns and was expended through the Red Cross or in harmony with Red Cross plans and methods. This gives a total in round numbers of about \$2,700,000, expended by or in close working cooperation with the Red Cross and in accordance with a single consistent system of expenditure and accounting. The remaining \$500,000 was expended chiefly in communities into which the Red Cross did not enter, because they were able and desirous of caring for their own suffering people. Cincinnati, Indianapolis, and Fort Wayne were the more important of those cities which met and solved their own problems.

No accurate estimate can be made of the value of food, supplies, clothing, and bedding contributed from every part of the country. The Chicago Association of Commerce alone purchased and shipped new supplies on the recommendation of the Red Cross of a value of over \$150,000. The National Cash Register Co. purchased and donated supplies at a cost of approximately \$159,000. There is no doubt that supplies contributed from all sources approached in value \$1,000,000, not including the enormous contributions of food, blankets, tents, and other necessary articles by the United States Army, represented in the distribution by Maj. J. E. Normoyle and a large staff of officers from the Quartermaster and Medical Corps.

As indicated above, the relief work is not completed. Considerable expenditures remain to be made, not alone to carry out plans

already entered upon, but also to supplement the work of the regular local relief agencies this winter, where the after effects of the flood have placed upon them a burden which they can not bear.

A thoughtful newspaper man, writing in the Ohio State Journal, after making a careful and intelligent inquiry into the operations of the Red Cross in connection with the recent floods, stated that on this occasion the American Red Cross was to be seen at its par value. While this statement is not to be taken too seriously, it is believed to be approximately correct as related to the present stage of our development and resources. We were not hampered by lack of funds. We were early upon the scene of the disaster. Our nurses were quickly mobilized and distributed wherever needed and in sufficient numbers. We assembled a greater number of trained agents than had been brought together by the Red Cross before in any single disaster. The number of Red Cross nurses hurried into the field was 238, and the number of trained administrative agents was 66. With respect to the force of social agents drawn from our Institutional Members and other societies, and their period of service, it may be questioned whether the Red Cross quite reached par. The average of efficiency shown by the administrative force was on the whole high, although there were a few individuals in the force whose training was slight, and whose service was correspondingly less valuable. A force, however, which is led in its various groups by Dr. Edward T. Devine of New York, Mr. J. W. Magruder of Baltimore, Mr. E. T. Lies of Chicago, Mr. C. M. Hubbard of St. Louis, Mr. James F. Jackson of Cleveland, Mr. Louis H. Levin of Baltimore, Mr. H. Wirt Steele of Baltimore, and Mr. S. P. Morris of Denver, is bound to give efficient service upon a basis comprehensive enough to meet any conditions which may arise.

The institutional membership plan was given by far the severest test which it has encountered, and again it completely demonstrated its value. In this instance, however, its chief weakness was also accentuated. That weakness lies in the inability of the institutional members to allow their representatives to remain in the emergency-relief work for a sufficient period of time. Continuity of service, especially by those who are in administrative positions, is of very great importance. The individual knowledge and experience of the leader who is in charge of relief work in its early stages are necessary to the best service in the latter stages of that work. It is true that when the leaders were compelled to return to their regular employment we were usually fortunate enough to obtain others who were competent; but however competent, they lacked the knowledge and experience of the early stages of the relief work. However full and complete the written records may have been, they could not take the place of personal knowledge and observation which included a multitude of facts and a body of experience impossible to be recorded. It is therefore important that the permanent staff of the Red Cross shall be strengthened by the addition of a few experienced and capable men, whose presence as leaders on a field of disaster will provide that continuity of effort necessary to prevent the interruption of a relief program, even though many changes may occur in the personnel of the administrative staff.

The several stages of the relief operations as they were worked out in connection with the flood were as follows:

1. Emergency relief.
2. House repair and reconstruction.
3. Furniture rehabilitation.
4. Business rehabilitation.
5. Final grants.

Each of these successive steps received chief emphasis in turn, although no sharp lines of demarcation separated them. In fact they merged into each other and were carried on in some degree simultaneously as circumstances required, for work of this character must be always elastic and instantly adaptable to local conditions.

The spirit which animated the flood-relief work and which in fact must animate all Red Cross relief operations if they are to be highly effective is suggested by a letter which the national director of the Red Cross addressed to all Red Cross special representatives a few weeks after the flood. Perhaps this report can do no better in closing than to quote this letter, which was as follows:

A month has passed since the flood occurred. Cities and towns are rapidly cleaning and repairing their streets, removing debris and setting their public utilities in order. Emergency relief activities have been gigantic and have accomplished wonders. The excitement and rush have passed. The inspiration and enthusiasm in helpfulness aroused by the danger and sufferings of many thousands of fellow men are subsiding. And now comes the true test of our efficiency. Our work is only fairly begun. It must go forward without the inspiration of early days. Family by family we must calmly and sympathetically consider the right thing to be done for each. We are dealing with individual problems, complex, various, infinite. We can not restore losses. Our relief fund is not an insurance fund. The amount of a family's losses is not an index to the relief which may be afforded it. The only guide for us is the extent of each family's need and its inability to reestablish itself. We must do what is necessary to help the hardest hit family to its feet and start it forward in self-support. Only that. Our fund will not permit more. Thus our work becomes a matter of learning the essential facts about each family and basing our action on those facts. Sympathy and actual knowledge must go hand in hand. In no other way can we discover and perform the particular service for each family which is necessary to give it the right start. And remember that common sense—our own accumulated experience with our fellows in our own lives—is the key which unlocks many perplexities.

Emergency relief should by this time be closed or reduced to its far ends. Closing relief stations and stopping the general issue of supplies does not imply that no more food or clothing will be available. Individual families can still be supplied. Closing relief stations, however, has two very important results:

1. It removes the public, visible sign of relief distribution, which is always abnormal and demoralizing and is a standing temptation and inducement to dependence.
2. It clears the slate and allows you to make a new start on a new basis. The routine is broken. Each family which makes application for help after the relief station is closed may be taken up anew and must justify its application by a showing of facts. Many will not reapply.

In every step and process relief operations must be positive and progressive. "Marking time" is losing time. A passive policy means failure. Keep things moving. If we wait for those who are receiving aid voluntarily to announce that they have enough, we will never get done. A good many will stop coming, but many will hang on. They have suffered and are discouraged, and the relief fund can not restore their losses. So they will remain hoping and growing more helpless every day. They must be carried forward to independence in spite of themselves.

All were self-supporting before the disaster. Act on the presumption that all will be self-supporting again and at once. If in occasional instances this can not be, give such instances kindly consideration and help with a view to hastening independence and stimulating new courage.

A final residuum of the helpless will remain; those who, from age or ill health or loss of the family wage earner, may not be able to regain their feet or at best can do

so only after months or years of effort. These must be given such kindly temporary help as is possible, but their problems must be left, for final solution, to the regular and ordinary helpful agencies of the community. It is hoped and believed that this residuum will be small. The steady progress of relief operations toward completion, involving, as it does, the future welfare of a large number of sturdy, useful citizens must not be retarded by the effort to restore that smaller pathetic number of those who can not respond to the stimulating movement toward a new life.

The relief movement should be a resistless current, carrying all before it, so far as is humanly possible, back to normal existence. The atmosphere should be electric with new energy, new hope, and a sense of better days at hand. The distribution of food and the provision of shelter and clothes are necessary, but the inculcation of courage and hope and determination is the secret of permanent success.

Many who have given invaluable, devoted, volunteer service are now compelled to respond to the imperative demands of their personal business affairs. It is important to retain a strong group of the most helpful of these volunteers. Their knowledge of local people and local conditions is essential in getting the flood sufferers readjusted to life. Finally, when the Red Cross must withdraw there will remain some unfinished fragments of relief work which must be left in the hands of the local volunteers and of the regular local relief agencies. Therefore, every consideration of humanity and efficiency requires that the volunteers and organized relief agencies shall be prepared to assume, without jar or interruption, these continuing lines of relief which under the most favorable conditions must be the legacy of every flood-stricken community.

TOWN AND COUNTRY NURSING.

The national relief board has been gratified with the evidences from many sources that Red Cross town and country nursing promises to meet a very real and widespread need. A report by the superintendent of this service gives an adequate account of its development.

CHRISTMAS SEALS.

In the five years from 1908 to 1912, inclusive, the annual sales of Red Cross Christmas seals have steadily increased. Each year predictions have been made that the popularity of this method of obtaining support for antituberculosis work would pass, but indications are not wanting that it is to be permanent. A great many tuberculosis societies and committees receive a large proportion of their support from this source, which indeed has proved to be the quickest and most effective method of obtaining support which they have found.

The outlook for the seal-selling season now in progress does not indicate any decline in results. In 1912 the Red Cross distributed to selling agents on their orders about 96,000,000 seals. Orders already filled for agents this year amount to 106,000,000 seals. These are on sale in every State in the Union except Florida, and the number of selling stations is many thousands. It was estimated last year that over 100,000 persons participated in the conduct of the seal campaign.

SERVICE OF THE INSTITUTIONAL MEMBERS AND OTHER PHILANTHROPIC AGENCIES.

This report could not justly be concluded without an expression, by the national relief board, of its deep appreciation of the invaluable service which has been given the Red Cross during the year by its institutional members and by other philanthropic organizations which have generously loaned experienced workers to help in the enormous tasks of emergency relief which the year has placed upon

the Red Cross. Mention should especially be made of the part taken in this large service by the following organizations:

Charity Organization Society of New York, N. Y.
 Association for Improving the Condition of the Poor, New York.
 Associated Charities of Boston, Mass.
 Society for Organizing Charity, Philadelphia, Pa.
 Federated Charities of Baltimore, Md.
 Federated Jewish Charities, Baltimore, Md.
 Associated Charities, Washington, D. C.
 Associated Charities, Pittsburgh, Pa.
 Charity Organization Society, Buffalo, N. Y.
 Associated Charities, Cleveland, Ohio.
 Associated Charities, Wheeling, W. Va.
 Associated Charities, Cincinnati, Ohio.
 Associated Charities, Detroit, Mich.
 Federated Charities, Toledo, Ohio.
 United Charities, Chicago, Ill.
 Association of Commerce, Chicago, Ill.
 Provident Association, St. Louis, Mo.
 Associated Charities, Evanston, Ill.
 Associated Charities, Des Moines, Iowa.
 Rocky Mountain Health Association, Denver, Colo.
 Associated Charities, Birmingham, Ala.

The Red Cross could not have accomplished the immense work which its record for 1913 shows without the loyal and skillful help of the trained men and women whose services were placed at its command by these societies. And it should be made clear that this service was not primarily to the Red Cross, but that through the Red Cross these societies have rendered a splendid and patriotic service to the Nation.

REPORT OF THE INTERNATIONAL RELIEF BOARD.

By JOHN BASSETT MOORE, Chairman.

As compared with former years the calls from foreign countries for aid from the American Red Cross have been few, and in most instances the assistance rendered has been but a continuation of work begun in 1911 and 1912, accounts of which were given by this board in its annual reports for those years. The report for 1913 will therefore consist chiefly of a brief recapitulation of what has been done by the American Red Cross in foreign countries in continuation of its earnest efforts to alleviate the suffering and distress there prevailing.

WAR BETWEEN TURKEY AND THE ALLIED BALKAN STATES.

For relief of the sick and wounded of the armies engaged in this war the American Red Cross received and remitted funds as follows:

To Turkey.....	\$2, 902. 00
To Servia.....	500. 00
To Greece.....	3, 584. 55

making a total of \$6,986.55. The difference in the amounts sent to each of the countries named was due to the fact that most of the contributions received were designated by the donors specifically for a particular country, and to the further fact that contributions not designated for a particular country were divided as nearly as possible in proportion to the number of sick and wounded to be cared for.

WAR AMONG THE FORMERLY ALLIED BALKAN STATES.

In July of this year hostilities broke out among the formerly allied Balkan States; and soon afterwards there came to the American Red Cross, through officers of the diplomatic and consular service as well as through other channels, urgent appeals for aid for large numbers of sick and wounded who were without adequate care. On three different occasions the American Red Cross made known through the press associations the facts reported to it. The contributions of the public amounted, however, only to the sum of \$2,413.44, to which the central committee added an appropriation of \$882 from the contingent relief fund of the Red Cross. This money was applied by the Red Cross organizations and by the American diplomatic and consular officers stationed in the countries involved in the war.

HOSTILITIES IN MEXICO.

The warfare which began in Mexico in 1911 has continued with little interruption to the present time. The operations of the American Red Cross have been confined largely to the relief of destitute American citizens residing in Mexico and to the repatriation of those who wished to return to the United States. This work was done in close cooperation with the Department of State and with its representatives in Mexico. These operations were conducted by the Red Cross at a cost of approximately \$20,000, this entire amount having been appropriated by the central committee from the contingent relief fund, no donations having been received by the Red Cross for this object.

The Red Cross was glad to be of service to the Department of State by having its organization and agents at San Francisco and San Diego, Cal.; El Paso, Tex.; New Orleans, La.; and New York City act as the representatives of the Secretary of State in rendering assistance to destitute American citizens who, under his direction and with funds placed at his disposal by Congress, were brought out of Mexico and returned to their former homes in this country. (A narration of these transactions will be given at this meeting by Charles Jenkinson, who has had actual charge of much of the work.)

SMALLPOX AT CARBO, MEXICO.

Upon receipt of an authentic report of an outbreak of smallpox at Carbo, Mexico, and a request for a supply of vaccine virus, the Red Cross purchased and forwarded to an American physician at that place the quantity requested. This gift proved of much value in the abatement of the epidemic.

RIVER CONSERVANCY IN CHINA.

Mr. Charles D. Jameson, the civil engineer sent to China by the American Red Cross in June, 1911, to make a study of the practicability of preventing by engineering methods the great river floods and the inevitable famines which follow in their wake, has continued his studies in that country, and has devised a plan which, if put into effect by the Chinese Government, would, it is believed, accomplish

the object of his mission. The Secretary of State has made known to the Chinese Government the hope of the Government of the United States that the measures devised by Mr. Jameson will be adopted and carried to completion.

MISCELLANEOUS RELIEF.

During the summer an appeal reached the Red Cross from the Thessalonica Agricultural Institute in Turkey for funds with which to buy seeds for planting, for which there was great need among the destitute people in the region in which the institute carries on its work. A small contribution for this purpose was appropriated from the contingent relief fund.

A small contribution received by the American Red Cross for the relief of flood sufferers in Italy was forwarded to the Italian Red Cross Society.

REPORT OF THE WAR RELIEF BOARD.

By Surg. Gen. CHARLES F. STOKES, United States Navy, Acting Chairman.

Some progress has been made by the committee on Red Cross medical work of the American Medical Association since our last annual meeting, and 125 replies to their circulars have been received, representing 32 different States. This, of course, is not a very satisfactory showing, and some six weeks ago, Dr. George M. Kober, of that committee, prevailed upon the American Medical Association to publish from their office, in the American Medical Association Bulletin, a circular calling for the cooperation of all medical societies. This has been done, and should produce action on the part of these organizations. The value of having local Red Cross committees in all medical societies was splendidly demonstrated during the past summer when the committee on Red Cross medical work of the District of Columbia was called upon to furnish 10 doctors for duty with the Red Cross organization which operated at Gettysburg, Pa., and assisted in the care of the veterans at the reunion held at that place upon the fiftieth anniversary of the Battle of Gettysburg, July 1 to 4, inclusive. The promptness with which that committee complied with our request and the character of the men supplied, more than justified the organization of such committees, with which the national headquarters can deal directly to obtain information and other cooperation and assistance.

So much has been written about the efficient work of all the organizations which assisted in the care of the veterans at the Gettysburg reunion that it is unnecessary to dwell on the part played by the Red Cross upon that occasion. However, it is a satisfaction to the war relief board to feel that the Red Cross was able to fulfill one of its most important functions, when it assisted the War Department in that work.

The special subcommittee of the war relief board on War and Navy Department orders covering the services of the Red Cross with the military forces met quite frequently in February and March of this year, and much valuable material has been presented regarding

the organization and equipment of Red Cross columns with tentative regulations governing the same. It is regrettable that so little has been done toward obtaining the model organizations of each class, which it was the sense of that committee should be established in the District of Columbia.

Two organizations, however, have been started in so far as the official heads and the assistant directors are concerned. In the capacity of director, Dr. Walter D. Webb, major, United States Army (retired), has accomplished this for the Army Field Column No. 1, American Red Cross, and Dr. Henry C. Macatee has taken similar action for Army Hospital Column No. 1.

It is hoped that at our next meeting at least the model organizations for the District of Columbia will have been completed and be ready for service. Every endeavor will be made to have organizations established in the other large cities of the country.

The only change in the personnel of this board for the current year has been the assignment of Maj. Robert U. Patterson, Medical Corps, United States Army, vice Maj. Charles Lynch, United States Army, who resigned to take up other duties under orders from the War Department.

Following the usual custom, separate reports will be read by the chairman of the first-aid committee, and by the chairman of the nursing committee, respectively.

REPORT OF THE FIRST-AID COMMITTEE.

By Maj. ROBERT U. PATTERSON, Chairman.

The last annual meeting was held December 11, 1912, and since that date there has been no opportunity to assemble the members of this committee.

PERSONNEL.

While there have been some individual changes, there has been no numerical change in the personnel of this department during the past year. The present chairman of the committee took charge of the department on the 30th of June, relieving Maj. Charles Lynch, Medical Corps, United States Army, who, after availing himself of a four-months' leave of absence, sailed for duty in the Philippine Islands on the transport leaving San Francisco November 5. Dr. Richard N. Mackey left the service of this department on the 31st of last May. In addition to the chairman, our present medical personnel consists of Dr. Matthew J. Shields, Dr. William T. Davis, and Dr. William N. Lipscomb. Two clerks, one storekeeper, and an errand boy comprise the office force. The services of our doctors have been utilized along the same lines as in the past; that is, two doctors constantly engaged on duty with our first-aid cars, and one occupied on special details, giving first-aid instruction among the industrial organizations of the country.

AFFILIATIONS.

We are cooperating, as in the past, with the Young Men's Christian Association, the Young Women's Christian Association, and the Boy

Scouts of America, in first-aid work. Two hundred and thirty-eight certificates in first-aid have been issued by this department in cooperation with the national board of the Young Women's Christian Association, and 707 joint certificates with the International committee of the Young Men's Christian Association. Directly from this office many Red Cross first-aid classes have been organized and instructed, to whom we have issued 576 certificates to men, 348 to women, and 285 to Boy Scouts. Prize certificates for contests have been awarded to 86 individuals.

MATERIALS.

The following editions of our first-aid book have been added to the list during the past year and are especially adapted to the particular needs of women, miners, police, and firemen. A first-aid box devised for the use of the employees of telephone companies has been placed on sale during the past year. A large number of these have been purchased from this department. A small sterile dressing has also been obtained suitable for application to small cuts, scratches, and wounds. These are put up in cartons containing 12 each. A splendid set of 16 charts descriptive of fractures, bandaging, wounds, bleeding, burning, electric shock, and methods of transportation of wounded, has also been added to our supply list. These charts are believed to be the best of this nature to be obtained anywhere to date. The sale of supplies in this department at the time of making this report shows an increase exceeding that for the previous year by more than 40 per cent.

RAILROADS.

After a long period of usefulness car No. 1 has been permanently laid aside, as it was in such condition as to be no longer adapted to our purposes. A sale for it has practically been concluded, and the proceeds will just about offset the expense incurred this year in repairing car No. 2. Our car No. 2 has been most actively engaged throughout the year, with the exception of a period of about six weeks, when it was laid up for much-needed repairs at the Chesapeake & Ohio Railroad shops at Huntington, W. Va.

In March a new car, generously donated by the Pullman Car Co., was turned over to this department for use in the work on railroads. This car is most complete in every detail and is so arranged that it could in emergency be used as a temporary hospital. It has attracted the greatest interest wherever it has been shown.

The present policy of the department is to keep one car engaged on railroads east of the Mississippi and the other on railroads west of that river. The lines that have been toured by our cars this year in our first-aid campaign are, by car No. 1, the Missouri Pacific and St. Louis & Southwestern Railroad of Texas; by car No. 3, the Buffalo, Rochester & Pittsburgh; International & Great Northern; Rock Island & Pacific; Northern Pacific; Seattle, Portland & Spokane; Great Northern & Chicago; Chicago, St. Paul, Minneapolis & Omaha; and the Illinois Central. Car No. 2 has covered the Lehigh Valley, Norfolk & Western, Chesapeake & Ohio, Chicago & Alton, and the following terminal companies in and near Chicago: Chicago Junction

Railways, Baltimore & Ohio Terminal, Belt Railways of Chicago, Western Indiana Terminal Co. At the time of writing car No. 2 is engaged on work over the Chicago, Milwaukee & St. Paul Railroad, and car No. 3 on a similar campaign with the New York, New Haven & Hartford Railroad. Six hundred first-aid meetings have been held this year, with an attendance of over 41,000 railroad employees and involving a travel of more than 18,000 miles.

MINES.

Whenever it has been practicable the services of our doctors have been given to mining companies on request. As the number of doctors in our service is limited, it has been impossible to meet all the demands made upon the department. If we had doctors available to lend to the Bureau of Mines for service on each of the six mine rescue cars they now keep circulating in the mining fields, it would accomplish a great work. However, the Bureau of Mines is under a Government department (Department of the Interior), and it is felt that they should now organize a medical service of their own, for which funds should be made available. Instruction in first aid for miners given by laymen is most unsatisfactory, and in first-aid contests, held to stimulate interest in first aid among miners, is one of the principal causes for dissatisfaction with the decisions of judges, etc. Teams trained by laymen should not compete with teams instructed by doctors. During the month of August seven companies of the bituminous coal region around Greensburg, Pa., were given the services of one of our field representatives in preparing them for a first-aid contest held at Greensburg on August 23. Another company which obtained the same privilege was the Pittsburgh-Baltimore Coal Co., of Adamsburg, Pa. A large number of first-aid classes have been organized among miners, leading to the granting of Red Cross certificates of proficiency. This department has furnished problems for use in first-aid contests, as well as judges, on many of these occasions. Prizes and certificates have also been donated to the best teams in such contests, and in many other ways we have endeavored to further the cause of first aid among miners.

OTHER INSTRUCTION.

The first-aid campaign, begun in December, 1912, among the employees of the different branches of the Bell Telephone Co. of Pennsylvania, was continued until February 12, 1913. Similar instruction was then given to the employees of the Chesapeake & Potomac Telephone Co. in Maryland and in the District of Columbia. We are at present in correspondence with a large telephone company in New York City which desires the services of one of our doctors for this work among its employees.

MEETINGS.

This department has been represented at the annual convention of the American Mine Safety Association in Pittsburgh and at the Southern Medical Association in Lexington, Ky., during the past year. We were unable to send a representative to the convention of the

National Congress for Industrial Safety, which met in New York in September, but we will take part in the Conference of Safety and Sanitation, which is to be held in New York City from the 11th to 20th of the present month.

EXHIBITIONS.

An exhibit consisting of literature, pictures, and a display of our first-aid books and other supplies was placed in the National Conservation Exposition at Knoxville, Tenn., and a similar, though smaller, one was shown at the convention of the American Mines Safety Association in Pittsburgh. At the present time we are taking part with the Red Cross Associations of Great Britain in an exhibition at Aberdeen, Scotland, under the direction of the Countess of Aberdeen.

MOVING-PICTURE FILM.

Another moving-picture film will be added to our equipment during the present month owing to the courtesy of Mr. Horace G. Plimpton, of the Edison Studio of New York City. This film shows first-aid work among the police of Berkeley, Cal., under the direction of Dr. Force, of that city.

PLANS FOR THE FUTURE.

We are very much interested at present in extending our work in order that we may place the knowledge of first aid and accident prevention within the reach of men employed in the lumber industries of the country. More than 800,000 men are said to be employed in this work, but there are no accurate statistics covering the United States. In Washington, however, they have exact figures, and in that State alone 47,400 men are employed. During the period October 1, 1911, to September 1, 1913, among these men there were 251 fatalities, 990 men permanently partially disabled, and 8,420 temporarily totally disabled. It is hoped that some financial backing will be given by lumber companies toward the support of a doctor for this department, who can be utilized for inaugurating and maintaining a system of first-aid instruction among the men who are following this hazardous vocation. Steps have already been taken to obtain this cooperation, and it is believed much will be accomplished in the coming year.

In the registration area of the United States, as shown by the census of 1911, but which only covers 63 per cent of the population of the country, there were the following fatalities, due to accidental injuries:

Railroads.....	7, 696
By automobiles.....	1, 291
From electric shock, excluding lightning.....	518
Street cars.....	1, 883
In other vehicles.....	2, 237
Total.....	13, 625

During the calendar year 1912 there were 2,360 fatalities in the coal mines of the United States, or one death for every 233,000 short

tons of coal produced. These figures alone are sufficient to keep up our desire to extend the work of accident prevention and first-aid teaching in mines and the other great industries of our country.

One of the most frequent causes of death in the United States is that of drowning. According to the census figures of 1911 (which are the last completed figures available), 5,571 accidental drownings occurred in that year, and 536 suicides by drowning. It is felt that steps should be taken looking to the organization of volunteer life-saving corps in all large cities on the coasts, the Great Lakes, and the rivers of the country. Our department has been investigating this matter and has a tentative plan formed for the accomplishment of such an organization under this department of the Red Cross. It will entail an outlay of about \$4,000 per annum, to be used in paying the salary and defraying the expenses of an instructor, who should travel through the country organizing local branches of this Red Cross organization. It is also intended to make a special effort during the coming year to interest more people in the work of organizing classes for Red Cross first-aid instruction. It is believed one of the best ways to attain this object will be by circularizing, and by direct correspondence with churches, fraternities, lodges, and other organized bodies. A special first-aid box for the use of automobilists will be placed on sale in the near future.

REPORT OF THE NATIONAL COMMITTEE ON RED CROSS NURSING SERVICE.

By JANE A. DELANO, Chairman.

MEETINGS.

A meeting of the committee was held June 26 in Atlantic City, followed by a conference with members of State and local committees who were present at the annual meeting of the American Nurses' Association. Several hundred Red Cross nurses were present and many questions of general interest were discussed. A regular meeting was also held December 9 in Washington, D. C., and routine business transacted.

PERSONNEL.

Owing to his transfer to the Philippines, Maj. Charles Lynch, Medical Corps, United States Army, has resigned from this committee, and in his place Maj. R. U. Patterson, Medical Corps, United States Army, has been appointed. Miss Georgia M. Nevins, who has served on the committee since its creation, has also resigned, and Mrs. Lenah S. Higbee, superintendent of the Navy Nurse Corps, has been appointed by the War Relief Board as her successor. Miss Julia C. Stimson and Miss Mary E. Gladwin have also been appointed to fill vacancies on the committee. The full committee is as follows:

Miss Jane A. Delano, chairman.
Miss Mabel T. Boardman.
Mrs. William K. Draper.
Maj. R. U. Patterson.

Dr. T. W. Richards.
Dr. William H. Welch.
Mrs. Frederick Tice.
Miss Emma M. Nichols.
Miss Alma E. Wrigley.
Mrs. Whitelaw Reid.
Miss Anna C. Maxwell.
Miss Isabel McIssac.
Mrs. Lenah S. Higbee.
Miss Mary E. Gladwin.
Miss Julia C. Stimson.

As the enrolled Red Cross nurses form the reserve for the Army and Navy, the Surgeon General of the Army has detailed a member of the Army Nurse Corps, Miss Anna Reeves, to assist in the record work of the office. This will add to the efficiency of the service and give the chairman more time for constructive work.

There has been a satisfactory increase in the number of enrollments, and even more discrimination and careful selection of nurses on the part of local committees. We now have over 4,200 enrolled Red Cross nurses, and have local committees in practically all of the large nursing centers in the United States.

The committees appointed primarily for the enrollment of nurses have responded with enthusiasm to all demands made upon them. In organizing our rural nursing service, we have sought their advice and assistance. In the development of our classes of instruction for women, we shall rely upon them to suggest instructors and examiners from among the Red Cross nurses.

RELIEF WORK.

We have had opportunity during the past year to test the efficiency of our Red Cross nursing service, and have been able to demonstrate that Red Cross nurses can be quickly mobilized and relied upon to work efficiently in the chaos following storm and flood, or under the strict discipline and Spartan simplicity of Army encampment.

Several relief stations were established in Washington during the inaugural ceremonies and a temporary hospital maintained at the Union Station. The local committee on nursing service, of which Miss Anna J. Greenlees is chairman, was in charge of the nursing service rendered, which was largely volunteer. In all 22 nurses were on duty, either at the temporary hospital or in the relief stations at this time.

In Omaha, Nebr., March 23, relief work was undertaken by Red Cross nurses immediately following the tornado, and a temporary hospital of 150 beds was established. Eight Red Cross nurses were continued in service for several weeks following the storm, caring for persons seriously injured.

During the first 48 hours following the Ohio flood, which occurred March 25, 77 nurses were assigned to duty by the Cincinnati local committee, and in response to telegrams sent from Washington 136 nurses from other cities reached the flooded area during the next 48 hours. These nurses were sent from Chicago, St. Louis, Detroit, Ann Arbor, Cleveland, and Akron; while 10 went from Washington and Baltimore on the "Post special," with the chairman of the national

committee. Red Cross nurses were assigned to the following cities in the flooded area:

Ohio.—Columbus, Dayton, Hamilton, Middleton, West Carrollton, Portsmouth, Miamisburg, Glendale.

Indiana.—Peru, Shawneetown.

Kentucky.—Catlettsburg, Maysville.

West Virginia.—Point Pleasant.

The number of nurses assigned to duty at any one place and the length of service depended upon local conditions.

We were fortunate in having an active Red Cross chapter in Cincinnati, cooperating with the local committee on Nursing Service, and through the prompt action of Miss Annie Laws, secretary of the Chapter, Miss Greenwood, chairman of the Nursing Committee, and Miss Reinecke, Red Cross nurse in charge of headquarters, nurses were sent to the stricken communities before organized relief could be undertaken. Detailed reports of the work done by our nurses under the supervision of Miss Mary E. Gladwin, chairman of the Ohio State Committee, and in charge of the nursing relief in Dayton; Miss Ella Phillips Crandall, of Teachers' College, New York, responsible for about fifty nurses doing sanitary inspection work under the direction of Maj. T. L. Roads, Medical Corps, United States Army; Miss Mary C. Wheeler, superintendent, Illinois Training School for Nurses, Chicago; Miss Emily McLaughlin, superintendent, Harper Hospital, Detroit; Miss Julia C. Stimson, in charge of social service work in St. Louis; Miss Jennie L. Tuttle, superintendent, Visiting Nurse Association, Columbus; Miss Mary B. Wilson and Miss Abbie Roberts, of Cincinnati, have already appeared in the Red Cross Magazine. These nurses and many others were relieved from responsible positions, and in some instances substitutes were employed, in order that they might meet their obligations as enrolled Red Cross nurses.

In describing the work of the Red Cross nurses in Dayton, Miss Gladwin says:

They may be found serenely picking their way around wrecked furniture, sodden mattresses, ruins of porches and sheds; wearing rubber boots, with skirts kilted high, wet nearly to the waist; sending sick people to the hospitals, inspecting plumbing, back yards, and cellars; superintending all sorts of work from feeding the baby to the digging of trenches. Through all parts of the flooded city nurses go on similar errands, inspecting nearly 9,000 homes and reporting conditions found.

Through the activity of Mrs. H. C. Lounsbury, chairman of the West Virginia State Committee on Red Cross Nursing Service, most efficient relief was rendered at Point Pleasant, W. Va. Mrs. Lounsbury and two other Red Cross nurses "went down the river on a boat loaded with supplies furnished by the citizens of Charleston and the neighboring towns." They found little sickness at Point Pleasant, and devoted their efforts chiefly to the distribution of clothing and supplies and the establishing and maintaining of sanitary conditions.

At the time of the Gettysburg reunion of veterans, June 28 to July 6, 70 Red Cross nurses selected by Pennsylvania local committee were assigned to duty in the two Army field hospitals, and 14 relief stations established by the Red Cross. Miss Sara M. Murray, secretary of the Philadelphia local committee, was appointed chief nurse. Much illness was anticipated among the veterans, and a large reserve of Red Cross nurses was held available, not only in Pennsylvania but in adjoining States. Fortunately, however, these additional

nurses were not needed. Miss Murray, in her report, states that 845 cases ill enough to require medical attention were cared for by the nurses, and 11,540 veterans suffering from exhaustion, heat, etc., were received at the relief stations.

Red Cross nurses were also assigned to relief station duty during parades, celebrations, etc., under the supervision of our local committees, in Washington, D. C., Cleveland, Detroit, and other cities.

CLASSES OF INSTRUCTION FOR WOMEN.

Just before the beginning of the year, the organization of classes of instruction for women was placed under the national committee on nursing service by resolution of the war relief board. Miss Marion Oliver, as organizer of these classes, brought to the department a splendid enthusiasm and an earnest desire to make this instruction for women worth while. And I deeply regret that she is not with us to-day to give a report of the work accomplished and to tell of our plans for the future. The instruction includes first aid, elementary hygiene, and home care of the sick, with possibly later courses in dietetics and household economy.

In the beginning we were handicapped by the lack of suitable textbooks, except in first aid, and efforts were largely directed toward the organization of these classes, which were conducted under the direction of the first aid department. Letters were sent to Red Cross chapters, schools, women's clubs, nurses' organizations, and Red Cross committees. The replies indicate a widespread interest in all matters relating to the health of the individual, community hygiene, and prevention of accidents.

During the summer a textbook on elementary hygiene and home care of the sick was prepared by the chairman of the national committee on nursing service in collaboration with Miss Isabel McIssac, superintendent of the Army Nurse Corps. In the preface to this book, written by Miss Boardman, she says:

One of the most significant facts in the march of human progress during the last decade is the great awakening of public interest in the questions of health. Work as hard as they might, neither the medical nor nursing professions could alone accomplish much along sanitary lines until the people in general became aroused to the importance of such matters. Knowledge that personal health depends largely upon the health conditions of the community brings home to each individual a serious personal interest and sense of responsibility. But in spite of the strongest barriers yet devised, disease can not always be kept out. To the gentle hands of woman belongs the care of the sick, and every woman should realize that the time may come when such a care will be hers.

The object of this instruction for women is not to fit them for professional service, but to make it possible for them to render such service to the sick in their own homes as may safely be intrusted to them.

The following classes have completed a course in elementary hygiene and home care of the sick under the direction of the Red Cross:

South Manchester, Conn., two classes; Washington, D. C., two classes; Philadelphia, Pa., one class.

Several classes are now receiving instruction in Philadelphia, Cincinnati, El Paso, and Paterson (N. J.), and other classes are being organized.

In a class largely made up of factory girls, recently examined in elementary hygiene and home care of the sick by one of our local committees on Red Cross nursing service, the general average for the class of 10, for both written and practical examinations, was over 85 per cent; the highest average being 90 per cent, with only one member of the class below 80, her standing being 79.5 per cent, on a scale of 100.

REPORT ON RED CROSS TOWN AND COUNTRY NURSING SERVICE.

By Mrs. WHITELAW REID, Chairman.

At the end of its first year we find the Red Cross town and country nursing service already promising development into a large organization, which in due course of time will interpret to a considerable degree that spirit of helpfulness in remote and small communities that was in the hearts of those by whom the idea of its organization was originally conceived. The Red Cross visiting nurse may be found in Vermont, Massachusetts, Ohio, New York, New Jersey, Maryland, Virginia, West Virginia, Kentucky, and South Carolina, 17 nurses altogether, the first one having received her appointment last July to an Ohio village.

The size of the communities where these nurses are at work varies from a few hundred scattered families to a population of 25,000, varying as diversely in environment, in customs, and in conditions of living. The request for affiliation with the Red Cross has come from several small cities, which, though not being strictly "rural," wished to be included within the scope of the service. In order that such communities might be consistently included, the name was recently changed to "town and country nursing service," those receiving appointment to it to be known as Red Cross visiting nurses. By this change the original purpose of the rural nursing service remains unmodified, yet at the same time its scope is broadened, and it may now include affiliations with nursing organizations in cities that are doing country or rural nursing.

Organizations applying for affiliation are asked to sign an agreement which includes certain conditions of affiliation, only such, however, as are deemed necessary to safeguard the best interests of an affiliated organization, the nurse, and the community at large.

Two of the Red Cross visiting nurses are employed by visiting nurse committees, six by nursing associations, two by Red Cross chapters, two by public health leagues, one of which is a county organization. One nurse is employed by a civic club, one by a league for friendly service; and one by an antituberculosis league. One nurse is employed by the Metropolitan Life Insurance Co. for supervisory work in New York State. Through the generosity of a member of the committee on town and country nursing, a nurse has been appointed to organize a nursing association in the Kentucky mountains, where it is anticipated, after a short period, the financial responsibility of the work will be assumed by the local community. This is one of the sections of our country where health conditions are so strongly indicative of all that public health nursing includes, and so often is it true that communities like this one, that need such institutions most, are the least able to meet the expense necessarily involved.

Appeals for financial assistance have been received from a considerable number of struggling nursing organizations. How to raise the necessary funds is the chief concern of many individuals and societies, who, realizing the need and usefulness of visiting nursing, employ all manner of means to this end. Visiting nursing is rapidly coming to form a part of educational systems, both county and State, as well as being an activity of boards of health, even in small communities. In some instances, where the nursing is carried on by a private society, the latter received an appropriation from county funds, and there seems to be no reason why such government boards should not, by mutual acceptance of certain stipulations, employ Red Cross visiting nurses. It is expected also that State organizations will eventually cooperate with the Red Cross in this work.

There remains much, however, yet to be accomplished by private organizations, and numerous small communities have awakened to their general living conditions and health needs. When writing to the Red Cross special mention is generally made of a particular reason why a nurse is needed. Sometimes it is the high infant mortality rate, sickness and epidemics among school children, the need of home instruction in clean and right living, insanitary conditions of the town, and, in fact, there seems to be hardly one interest concerning private or public welfare that is not at least touched by the activity of the visiting nurse. She, as often none other in the community, represents no special business interest, race, or denomination. Her services are for all alike. Thus the organization has behind it the common interest of the entire community.

A colored nurse who has recently left New York City, where she worked for many years among the poorer people, and is now living in a South Carolina community, in describing their need for rural nursing, writes:

I don't believe I ever saw so many neglected women and children anywhere as I find here among my people. They simply do not know how to live. This is a country seat of 1,600 inhabitants, mostly all colored. It is a great farming section, cotton being the chief industry, and, of course, most of the families are working in the fields all week. The children are left half fed and half clothed. Those that should be in the schools are in the fields, and will not start to school until January 1 and stop March 1 to begin planting. There is no hospital here for the sick, the nearest being 23 miles away, and they will not take colored patients under \$10 per week. The homes are mostly one or two-room cabins, with little or no comforts. I went out about 5 miles with the doctor last week to see a case. We found a mother with a baby two weeks old lying on a bed of straw in one corner of the room, with no fire or food in the house. It was the saddest thing I have ever seen. We made her as comfortable as possible.

The nursing associations in several communities are anticipating the time when they may start other social activities after visiting nursing is well established, thus developing the idea of a community center. Two affiliated organizations already have suggested building a home for their nurses which would include a room for dispensary work and emergency cases, rooms for classes of the young people in home care of the sick and baby clinics, and which would equip the organization to take some of the student nurses who are preparing for Red Cross visiting nursing for their month of rural experience.

The dearth of adequate courses in public-health nursing throughout the United States is one of vital concern to the town and country nursing service. If rural nursing calls for not only the best women

but the best equipped nurses, as all will agree it does, the grade of training our selected group will receive is of supreme importance. Whatever place the town and country nursing service may fill as a national administrative organization for the bettering of living conditions will be determined by the individual workers. Teachers' college last October was the first educational institution in the country to offer a course by which graduate nurses could receive academic instruction in rural problems in connection with a short course of public-health nursing. Henry Street Settlement, in New York City, cooperates with the college, and gives the nurses their practical experience under close supervision. The New York Board of Health takes the nurses for one month where they get in touch with school nursing and tuberculosis work, and the Northern Westchester Association offers opportunity the last month for rural experience. Two afternoons are given each week during the entire four months to teachers' college for lectures and class instruction. The University of Virginia is considering the establishment of such a course within a few months, which will equip nurses who locate in this section of the country with a practical knowledge of the psychology and needs of the mountaineer. Several nursing institutions have expressed an intention of adding to their curriculum special studies of value to rural nurses.

To reach the most neglected communities, it is necessary for an organizer to spend much time in the field, and the demand for this work will in future be more adequately met by the appointment of another nurse, whose salary will be paid by the Red Cross. With this addition to the staff, it will be possible to make regular and systematic visits of inspection to affiliated organizations, and more opportunity will be available to respond to the many calls asking for some one to present the work at various clubs and mass meetings, which has been possible thus far only to a limited degree.

The Russell Sage Foundation, through its southern highland department, is interested in getting certain agencies to work in this section. Last spring, under the auspices of this department, a representative of the Red Cross, in this instance the superintendent of nurses, visited five counties in the Kentucky mountains, stopping at various denominational schools scattered here and there through this mountain country, and learning what opportunities existed for the introduction of Red Cross visiting nursing. Such opportunities there are, and with greater facilities for assisting in the organization of local associations we hope, within a few years, many of these isolated dwellers will be familiar with the work of the Red Cross visiting nurse.

Upon the suggestion of the Surgeon General of the Navy, a Red Cross nurse was sent to Alabama for two weeks in September, where she accompanied several health and agricultural specialists who held numerous public meetings in large and small towns of several counties. She presented the work of the public health nurse and the Red Cross town and country nursing service at the University of Alabama to women's clubs and to many audiences in country places. A letter recently received from a nurse in this State tells of her plan to start out on an educational health campaign from her local tuberculosis society through country districts of her county, and says

that her inspiration to do this had come through her recent meeting with our Red Cross nurse in Alabama.

A summary of the year of the town and country nursing service would hardly be complete without mention being made of the exhibit which was used for the first time at the international dry-farming congress in October at Tulsa, Okla. It will be used at various conventions and in small communities that are considering public health nursing, as it portrays in a simple way, by charts and photographs, the work of a Red Cross visiting nurse on her round of daily visits. This exhibit was prepared by the superintendent of this department, who has had charge of the Red Cross town and country nursing during the past year.

The publicity given Red Cross visiting nursing has been largely among nurses, through hospitals, alumnae associations, and annual meetings of State associations and other nurses' organizations throughout the country where rural nursing has been presented. As yet very little has been given to the public through the press, but we have now reached the time when considerable emphasis will be placed upon this feature of the work. With increased facilities to stimulate interest in public health nursing and with a broader knowledge of the scope of the Red Cross town and country nursing service, we may depend upon a corresponding increase in the number of affiliated organizations.

ANNUAL REPORT OF THE TREASURER OF THE TRUSTEES OF THE ENDOWMENT FUND.

[Jan. 1, 1913, to Dec. 31, 1913.]

Balance sheet, close of December, 1913.

F.R.

Cash.....	\$3,193. 09
Bonds and stocks.....	920,296. 38
	923,489. 47

C.R.

Endowment fund, capital:	
Cash.....	\$2,691. 42
Securities.....	815,271. 35
	817,962. 77
The William Howard Taft special endowment, capital, securities.....	5,000. 00
The William Howard Taft special endowment, income, cash.....	511. 67
Town and country nursing service endowment fund, capital, securities..	100,025. 03
	923,489. 47

Schedule of cash receipts.

Date.	Description.	Account.	Amount.
1913.			
Jan. 2	Interest on balances in bank, American Security & Trust Co.	Endowment fund, income..	\$482.67
17	Interest on securities.....	do.....	2,638.58
	Northern Pacific Ry. bonds..... \$50.00		
	Union Pacific Ry. bonds..... 40.00		
	Kansas City Terminal Ry. bonds..... 800.00		
	West Shore R. R. bonds..... 400.00		
	Oregon-Washington R. R. & Navigation Co. bonds..... 300.00		
	Great Northern Iron Ore certificates..... 78.50		
	Provident Loan Society certificates..... 1,170.00		
		W. H. Taft special endowment, income.....	150.00
Feb. 15	Interest on securities, Metropolitan Club bond.....	Endowment fund, income...	11.25
Mar. 8	Interest on securities.....	do.....	9,762.50
	New York City stock..... \$8,075.00		
	Chesapeake & Ohio Ry. bonds..... 1,687.50		
Apr. 3	Interest on securities, Northern Pacific Ry. bonds.....	do.....	50.00
7	Interest on securities, Chicago, Rock Island & Pacific Ry. bonds.....	do.....	1,000.00
May 8	Interest on securities.....	do.....	3,225.00
	New York City stock..... \$2,100.00		
	Detroit Terminal & Tunnel bonds..... 1,125.00		
July 1	Interest on balances in bank, American Security & Trust Co.	do.....	500.15
8	Interest on securities.....	do.....	2,760.00
	Kansas City Terminal Ry. bonds..... \$800.00		
	Oregon-Washington R. R. & Navigation Co. bonds..... 300.00		
	Northern Pacific Ry. bonds..... 50.00		
	West Shore R. R. bonds..... 400.00		
	Union Pacific Ry. bonds..... 40.00		
	Provident Loan Society certificates..... 1,170.00		
		W. H. Taft special endowment, income.....	150.00
15	American National Red Cross, transfer of funds.....	Endowment fund.....	2,520.10
Sept. 10	Interest on securities.....	Endowment fund, income...	9,967.50
	Chesapeake & Ohio Ry. bonds..... \$1,687.50		
	New York City stock..... 8,075.00		
	Baltimore & Ohio R. R. bonds..... 225.00		
10	Interest on securities, Metropolitan Club bond.....	do.....	11.25
Oct. 4	Interest on securities.....	do.....	280.00
	New England Telephone & Telegraph Co. bonds..... \$125.00		
	City & Suburban Ry. bonds..... 125.00		
11	Interest on securities.....	do.....	1,050.00
	Northern Pacific Ry. bonds..... \$50.00		
	Chicago, Rock Island & Pacific Ry. bonds..... 1,000.00		
Nov. 13	Interest on securities.....	do.....	3,225.00
	New York City stock..... \$2,100.00		
	Detroit Terminal & Tunnel bonds..... 1,125.00		
26	Interest on securities, Great Northern Iron Ore certificates.....	do.....	78.50
Dec. 26	Interest on securities, St. Louis Southwestern Ry. bonds.....	do.....	100.00
31	American National Red Cross, transfer of funds.....	Endowment fund.....	211.00
	Total cash receipts.....		38,363.23

Schedule of cash payments.

Date.	Description.	Voucher.	Account.	Amount.
1913.				
July 2	American National Red Cross, partial interest earnings in principal of the William Howard Taft special endowment.	13	W. H. Taft special endowment, income.	\$50.00
21	American Security & Trust Co.	14	{Endowment fund, capital ...	21,032.50
	\$10,000 Baltimore & Ohio R. bonds—		{Endowment fund, income...	340.84
	Bonds cost..... \$9,062.50			
	Accrued interest..... 171.25			
	<u>9,233.75</u>			
	\$5,000 St. Louis Southwest- ern Ry. bonds—			
	Bonds cost..... 3,856.25			
	Accrued interest..... 20.11			
	<u>3,882.36</u>			
	\$5,000 New England Tele- graph & Telephone Co. bonds—			
	Bonds cost..... 5,068.75			
	Accrued interest..... 74.31			
	<u>5,143.06</u>			
	\$3,000 City & Suburban Ry. bonds—			
	Bonds cost..... 3,045.00			
	Accrued interest..... 69.17			
	<u>3,114.17</u>			
25	American Security & Trust Co., for charges in connection with registration of City & Suburban Ry. bonds: Registration fee..... \$1.50 Registration insurance..... .47	15	Endowment fund, capital...	1.97
29	American Security & Trust Co.	16	{Endowment fund, capital ...	2,031.30
	\$2,000 City & Suburban Ry. bonds—		{Endowment fund, income...	49.44
	Bonds cost..... \$2,031.30			
	Accrued interest..... 49.44			
Dec. 29	American National Red Cross, transfer of earnings on principal of endowment fund.	17	do.....	38,166.84
	Total cash payments.....			61,672.89

Schedule of gifts.

Dec. 10, 1913:

From Mr. Jacob H. Schiff, of New York, N. Y., certain securities to establish an endowment fund for the town and country nursing service, the income from said securities to be used for the current expenses of that service. Securities so donated, together with value at which accepted, as follows—

\$25,000 (£5,000) city of Tokyo, Japan, 5 per cent loan of 1912, valued at.....	\$21,545.45
25,000 Hudson & Manhattan R. R. first lien and refunding mortgage bonds, valued at.....	21,812.50
23,000 St. Louis, Peoria & Northwestern Ry. first mortgage gold bonds, valued at.....	24,121.25
25,000 St. Louis & San Francisco R. R. refunding mortgage gold bonds, valued at.....	17,977.08
15,000 Wabash R. R. second-mortgage 5 per cent 50-year bonds, valued at.....	14,568.75

113,000 Par value of securities, taken on books at market value of.....	100,025.03
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Endowment fund, capital.

Balance, Jan. 1, 1913:

Cash.....	\$23, 016. 09	
Securities.....	792, 205. 58	
		<u>\$315, 221. 67</u>

RECEIPTS.

Cash, from American National Red Cross.....		2, 731. 10
Securities as follows, received from purchase:		
\$10,000 Baltimore & Ohio R. R. 20-year 4½ per cent convertible bonds, valued at.....	\$9, 062. 50	
\$5,000 St. Louis Southwestern Ry. first consolidated mortgage 4 per cent gold bonds, valued at.....	3, 856. 25	
\$5,000 New England Telephone & Telegraph Co. 5 per cent bonds of 1912, valued at.....	5, 068. 75	
\$3,000 City & Suburban Ry. of Washington first-mortgage gold bonds, valued at.....	3, 046. 97	
\$2,000 City & Suburban Ry. of Washington first-mortgage gold bonds, valued at.....	2, 031. 30	
		<u>23, 065. 77</u>
		<u>841, 018. 54</u>

DISBURSEMENTS.

Expended for purchase of securities, as follows:

\$10,000 Baltimore & Ohio R. R. 20-year 4½ per cent convertible bonds.....	\$9, 062. 50	
\$5,000 St. Louis Southwestern Ry. first consolidated mortgage 4 per cent gold bonds.....	3, 856. 25	
\$5,000 New England Telephone & Telegraph Co. 5 per cent bonds of 1912.....	5, 068. 75	
\$3,000 City & Suburban Ry. of Washington first-mortgage gold bonds.....	3, 046. 97	
\$3,000 City & Suburban Ry. of Washington first-mortgage gold bonds.....	2, 031. 30	
		<u>\$23, 065. 77</u>

On hand, balance, Dec. 31, 1913:

Cash.....	2, 681. 42	
Securities.....	815, 271. 35	
		<u>817, 952. 77</u>
		<u>841, 018. 54</u>

Endowment fund, income.

Balance Jan. 1, 1913..... \$3, 225. 00

RECEIPTS.

Interest received from securities.....	\$34, 349. 50	
Interest received from bank balances.....	982. 62	
		<u>38, 557. 12</u>

DISBURSEMENTS.

Accrued interest on securities purchased.....	\$390. 28	
Transferred to American National Red Cross.....	38, 166. 84	
		<u>38, 557. 12</u>

Leaving no balance on hand Dec. 31, 1913.

The William Howard Taft special endowment, capital.

Balance Jan. 1, 1913, securities..... \$5, 000. 00

There were no additions to nor deductions from the principal of this fund during the year.

The William Howard Taft special endowment, income.

Balance Jan. 1, 1913.....	\$261. 67
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RECEIPTS.

Interest received from securities.....	300. 00
	561. 67

DISBURSEMENTS.

Transferred to American National Red Cross.....	\$50. 00
On hand, balance, Dec. 31, 1913, cash.....	511. 67
	561. 67

Town and country nursing-service endowment fund, capital.

RECEIPTS.

Securities, received from gift, valued at.....	\$100, 025. 03
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There were no deductions from the principal of this fund during the year.

Cash.

Balance, Jan. 1, 1913:	
Capital accounts.....	\$23, 016. 09
Income accounts.....	3, 486. 67
	\$26, 502. 76

RECEIPTS.

Capital accounts.....	2, 731. 10
Income accounts.....	35, 632. 12
	38, 363. 22
	64, 865. 98

DISBURSEMENTS.

Capital accounts.....	23, 065. 77
Income accounts.....	38, 607. 12
	61, 672. 89
On hand, balance, Dec. 31, 1913:	
Capital accounts.....	2, 681. 42
Income accounts.....	511. 67
	3, 193. 09
	64, 865. 98

Schedule of securities.

Name.	Par value.	Book value.	Market value (Dec. 31).	Rate of interest.	Annual interest.
ENDOWMENT FUND.					
Baltimore & Ohio R. R., 20-year 4½ per cent convertible.....	\$10,000.00	\$9,082.50	\$9,100.00	4½	\$450.00
Chesapeake & Ohio Ry., general mortgage gold.....	75,000.00	75,972.50	69,750.00	4½	3,375.00
Chicago, Rock Island & Pacific Ry., first and refunding mortgage.....	50,000.00	44,731.25	36,000.00	4	2,000.00
City & Suburban Ry., first mortgage gold.....	5,000.00	5,078.27	5,000.00	5	250.00
Detroit Terminal & Tunnel, first mortgage 50-year gold.....	50,000.00	50,031.25	47,500.00	4½	2,250.00
Great Northern Iron Ore Properties, certificates of beneficial interest.....	None.	6,711.75	5,338.00	.....	.....
Kansas City Terminal Ry., first mortgage gold.....	40,000.00	39,359.75	36,800.00	4	1,600.00
Metropolitan Club, Washington, D. C., first mortgage.....	500.00	500.00	475.00	4½	22.50
New England Telephone & Telegraph Co., 5 per cent bonds of 1912.....	5,000.00	5,068.75	5,050.00	5	250.00
New York City, corporate stock.....	120,000.00	109,219.70	100,800.00	2½	4,200.00
Do.....	390,000.00	385,031.88	380,000.00	4½	16,150.00
Northern Pacific Ry., prior lien railway and land grant.....	5,000.00	5,112.25	4,625.00	4	200.00
Oregon-Washington R. R. & Nav. Co., first and refunding mortgage.....	15,000.00	13,743.75	13,200.00	4	600.00
Provident Loan Society of New York, certificates of contribution.....	39,000.00	39,000.00	39,000.00	6	2,340.00
St. Louis Southwestern Ry., first consolidated mortgage, 4 per cent gold.....	5,000.00	3,866.25	3,775.00	4	200.00
Union Pacific Ry., first mortgage railroad and land grant.....	2,000.00	2,057.50	1,900.00	4	80.00
West Shore R. R., guaranteed first mortgage.....	20,000.00	20,734.00	13,300.00	4	800.00
Total.....	821,500.00	815,271.35	776,613.00	.....	34,767.50
WILLIAM HOWARD TAFT SPECIAL ENDOWMENT.					
Provident Loan Society of New York.....	5,000.00	5,000.00	5,000.00	6	300.00
TOWN AND COUNTRY NURSING-SERVICE ENDOWMENT FUND.					
City of Tokyo, Japan, 5 per cent loan of 1912.....	25,000.00	21,545.45	21,375.00	5	1,250.00
Hudson & Manhattan R. R., first lien and refunding mortgage, series A.....	25,000.00	21,812.50	20,250.00	5	1,250.00
St. Louis, Peoria & Northwestern Ry., first mortgage gold bonds.....	23,000.00	24,121.25	23,345.00	5	1,150.00
St. Louis & San Francisco R. R., refunding mortgage gold.....	25,000.00	17,977.08	17,750.00	4	1,000.00
Wabash R. R., second mortgage 5 per cent 50-year.....	15,000.00	14,568.75	14,100.00	5	750.00
Total.....	113,000.00	100,025.03	96,820.00	.....	5,400.00
RECAPITULATION, ALL SECURITIES.					
Endowment fund.....	821,500.00	815,271.35	776,613.00	.....	34,767.50
The William Howard Taft special endowment.....	5,000.00	5,000.00	5,000.00	.....	300.00
Town and country nursing-service endowment fund.....	113,000.00	100,025.03	96,820.00	.....	5,400.00
Grand total.....	939,500.00	920,296.38	878,433.00	.....	40,467.50

ANNUAL REPORT OF THE TREASURER.

[January 1, 1913, to December 31, 1913.]

Treasurer's fund balance sheet, Dec. 31, 1913.

DE.

Treasurer's fund balances.....		\$697, 856. 29
General fund.....	\$55, 260. 45	
Contingent relief fund.....	33, 310. 98	
Rural nursing fund.....	1, 856. 06	
Chinese famine relief fund.....	1, 614. 73	
Titanic wreck fund.....	1, 150. 00	
Storm and flood relief fund.....	604, 661. 07	
Cincinnati mine disaster relief fund.....	3. 00	
		697, 856. 29
Fiscal officers' fund balances.....		56, 200. 46
General fund.....	489. 11	
Contingent relief fund.....	2, 662. 35	
Rural nursing fund.....	299. 00	
Storm and flood relief fund.....	22, 750. 00	
Mississippi River flood fund.....	30, 000. 00	
		56, 200. 46

754, 056. 75

OR.

Consolidated fund balances.....	\$754, 056. 75
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Treasurer's asset balance sheet, Dec. 31, 1913.

DE.

Cash in hands of treasurer	\$697, 856. 29
Cash in hands of fiscal officers.....	56, 200. 46
	754, 056. 75

CR.

General surplus, Jan. 1, 1913.	155, 565. 23
Net revenue for 1913.....	\$2, 116, 594. 79
Net expenditures for 1913.....	1, 518, 103. 27
Surplus for 1913.....	598, 491. 52
General surplus, Dec. 31, 1913.....	754, 056. 75

Operation account, 1913.

Funds.	Net expenditures.	Net revenues.	Surplus.	Deficit.
General fund.....	\$90,637.55	\$120,664.21	\$30,026.66	
Contingent relief fund.....	40,153.28	1,062.80		\$39,090.48
Rural nursing fund.....	5,918.07	2,316.00		3,602.07
Chinese famine relief fund.....	1,000.00	176.72		823.28
Titanic wreck fund.....	793.75	1,400.00	606.25	
Washington Place factory fire fund.....		100.00	100.00	
Mississippi River flood fund.....	20,000.00	2,000.00		18,000.00
Balkan War relief fund.....	6,986.55	8,999.35	2,012.80	
Second Balkan War relief fund.....	2,460.04	2,114.61		345.43
Storm and flood relief fund.....	1,345,377.38	1,972,788.45	627,411.07	
Cincinnati mine disaster relief fund.....		3.00		
Deposits by communities for salaries of rural nurses.....	2,045.55	2,238.55	193.00	
Endowment fund.....	2,731.10	2,731.10		
Total.....	1,518,103.27	2,116,564.79	660,352.78	61,861.26
Deduct deficit.....			61,861.26	
Surplus income for year 1913 under all funds.....			598,491.52	

Condensed summary of fund receipts, disbursements, and balances.

Funds.	Balance, Jan. 1, 1913.	Receipts.		
		By contribution, etc.	Transferred from other funds.	Total.
General fund.....	\$25,722.90	\$120,722.68		\$146,445.58
Contingent relief fund.....	12,845.74	2,791.99	\$62,563.50	78,201.23
Rural nursing fund.....	5,564.13	2,316.00	193.00	8,073.13
Chinese famine relief fund.....	21,638.41	176.72		21,815.13
Titanic wreck fund.....	543.75	1,400.00		1,943.75
Washington Place factory fire fund.....	19,048.16	100.00		19,148.16
Mississippi River flood fund.....	68,440.66	2,000.00		70,440.66
Balkan War relief fund.....	1,761.48	8,999.35		10,760.83
Second Balkan War relief fund.....		2,114.61	345.43	2,460.04
Storm and flood relief fund.....		2,030,590.00		2,030,590.00
Cincinnati mine disaster relief fund.....		3.00		3.00
Deposits by communities, salaries rural nurses.....		2,308.79		2,308.79
Endowment fund.....		2,731.10		2,731.10
Total.....	155,565.23	2,176,254.24	63,101.93	2,394,921.40

Funds.	Disbursements.			Balance Dec. 31, 1913.
	By voucher.	Transferred to other funds.	Total.	
General fund.....	\$90,696.02		\$90,696.02	\$55,749.55
Contingent relief fund.....	41,882.47	\$345.43	42,227.90	35,973.33
Rural nursing fund.....	5,918.07		5,918.07	2,155.06
Chinese famine relief fund.....	1,000.00	19,200.40	20,200.40	1,614.73
Titanic wreck fund.....	793.75		793.75	1,150.00
Washington Place factory fire fund.....		19,148.16	19,148.16	
Mississippi River flood fund.....	20,000.00	20,440.66	40,440.66	30,000.00
Balkan War relief fund.....	6,986.55	3,774.28	10,760.83	
Second Balkan War relief fund.....	2,460.04		2,460.04	
Storm and flood relief fund.....	1,403,178.93		1,403,178.93	627,411.07
Cincinnati mine disaster relief fund.....				3.00
Deposits by communities, salaries rural nurses.....	2,115.70	193.00	2,308.79	
Endowment fund.....	2,731.10		2,731.10	
Total.....	1,577,762.72	63,101.93	1,640,864.65	784,066.75

*General fund.***FUND RECEIPTS.****General work:**

Annual membership dues.....	\$3, 277. 89
Sustaining membership dues.....	703. 00
Contributions.....	1, 568. 97
Advertisements in Red Cross Magazine.....	1, 834. 92
Subscriptions to Red Cross Magazine.....	6. 70
Interest from bank balances.....	13, 422. 86
Christmas seals—	
1913.....	19. 50
1912.....	38, 968. 12
1911.....	6. 76
Medals, badges, ribbons.....	3. 50
Income from endowment fund investments.....	38, 166. 84
Refundment, Knoxville Exposition.....	47. 17

Total, general work..... 103, 026. 23

First-aid department:

Contributions.....	1. 00
Medals, badges, ribbons.....	22. 50
First-aid supplies.....	15, 532. 02
First-aid instruction in commercial institutions.....	1, 236. 78
First-aid instruction in women's first-aid classes.....	585. 15
Income from William Howard Taft special endowment fund.....	50. 00

Total, first aid department..... 17, 427. 45

Nursing service:

Contributions.....	250. 00
Medals, badges, ribbons.....	19. 00

Total, nursing service..... 269. 00

New York office: No receipts.

FUND PAYMENTS.**General work:****Personal services—**

Secretary.....	\$2, 500. 00
Clerks at headquarters.....	3, 695. 51
Assistant treasurer.....	200. 00
Janitor.....	120. 00
National director.....	7, 500. 00
Clerks, national director's office.....	1, 800. 00
Clerk to trustees of endowment fund.....	200. 00
Miscellaneous personal services.....	5. 64

Services other than personal—

Transportation of persons.....	259. 04
Transportation of things—	
Freight.....	65. 50
Express.....	78. 70
Customhouse charges.....	4. 34
Subsistence and support of persons.....	290. 10
Communication service—	
Telegraph.....	1, 049. 56
Telephone.....	76. 71
Cable.....	104. 04
Messenger.....	1. 25
Postage.....	852. 27
Printing, engraving, lithographing, binding.....	492. 89
Red Cross Magazine.....	5, 049. 02
Commissions on advertisements in Red Cross Magazine.....	212. 27
Illustrating lectures.....	19. 76
Ninth International Conference.....	608. 81
Contingent office expenses.....	419. 72

General work—Continued.

Services other than personal—Continued.

Knoxville Exposition.....	\$589.82
Ninth annual meeting.....	135.00
Miscellaneous services other than personal.....	45.16
Supplies—	
Stationery.....	600.24
Office supplies.....	336.56
Photographic supplies.....	93.42
Magazines and pamphlets.....	233.00
Red Cross flags.....	10.50
Medals, badges, ribbons.....	361.64
Christmas seals—	
1913.....	18,146.35
1912.....	11,005.89
Miscellaneous supplies.....	5.25
Equipment—	
Furniture and fixtures.....	60.50
Office equipment.....	638.98
Educational equipment.....	82.00
Library stock.....	17.00
Maintenance—	
Repairs to electric fans.....	2.25
Repairs to furniture and fixtures.....	4.50
Fixed charges—	
Rent of offices.....	420.00
Rent of safe-deposit box, trustees of endowment fund.....	7.50
Rent of typewriters.....	10.00
Refundments: Annual membership dues.....	4.00
Total, general work.....	58,414.69

First-aid department:

Personal services—

Field agent—	
Shields.....	3,000.00
Mackey.....	833.30
Davis.....	2,000.00
Lipecomb.....	880.00
Pharmacist.....	720.00
Clerks, headquarters first-aid department.....	937.69
Clerical services in the field.....	19.20
Office boy, headquarters first-aid department.....	113.00
Cook—	
Car No. 1.....	58.90
Car No. 2.....	600.00
Car No. 3.....	410.86
Examiners, women's first-aid instruction classes.....	85.00
Prizes for efficiency among trainmen.....	50.00
Prizes for best example application first-aid principles.....	100.00
Miscellaneous personal services.....	241.77
Services other than personal—	
Transportation of persons.....	876.74
Transportation of things—	
Freight.....	110.55
Express.....	171.97
Cartage.....	2.10
Subsistence and support of persons.....	2,110.98
Communication service—	
Telegraph.....	100.42
Telephone.....	60.30
Messenger.....	1.00
Postage.....	347.32
Printing, engraving, lithographing, binding.....	247.15
Contingent office expenses.....	63.31
Presidential inauguration.....	72.65
Mine safety exhibit.....	30.10
Miscellaneous services other than personal.....	36.74

First-aid department—Continued.**Supplies—**

Stationery.....	\$292.77
Office supplies.....	72.92
Photographic supplies.....	5.00
Cleaning and toilet supplies.....	2.25
Wearing apparel.....	2.00
Medals, badges, ribbons.....	125.00
First-aid supplies.....	11,863.48
Miscellaneous supplies.....	4.50
Commercial reference books.....	5.00

Equipment—

Furniture and fixtures.....	74.75
Office equipment.....	150.45
Library stock.....	1.00

Equipment—

Car No. 2.....	.75
Car No. 3.....	.75

Kitchen, dining-room, and sleeping furnishings—

Car No. 1.....	.84
Car No. 2.....	6.90
Car No. 3.....	14.49

Maintenance—

Repairs, first-aid car No. 1.....	108.60
Repairs, first-aid car No. 2.....	392.41
Repairs to typewriters.....	8.00
Repairs to furniture and fixtures.....	3.00

Fixed charges—

Rent of offices.....	690.00
Rent of typewriters.....	2.50

Refundments—Women's first-aid classes.....

7.30

Total, first-aid department..... 28,135.71

Nursing service:**Personal services—**

Clerks, superintendent's office, nursing service.....	1,301.48
Examiners, classes in home care of sick.....	6.00

Services other than personal—

Transportation of persons.....	29.60
Transportation of things—Express.....	3.20
Subsistence and support of persons.....	20.80

Communication service—

Telegraph.....	11.62
Telephone.....	26.14
Postage.....	317.11

Printing, engraving, lithographing, binding.....	275.90
Contingent office expenses.....	20.31

Miscellaneous services other than personal.....	2.50
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Supplies—

Stationery.....	166.82
Office supplies.....	7.84
Medals, badges, ribbons.....	225.70

Equipment:

Furniture and fixtures.....	17.45
Office equipment.....	93.35

Fixed charges—Rent of offices.....

473.75

Total, nursing service..... 2,999.57

New York office:

Personal services—

Secretary, New York office.....	\$750.00
Clerks.....	4.00
Office boy.....	40.25

Services other than personal—

Communication service—

Telephone.....	26.45
Postage.....	99.59
Contingent office expenses.....	44.20
Supplies—Stationery.....	9.00
Maintenance—Repairs to typewriters.....	2.50
Fixed charges—Rent of offices.....	170.06

Total, New York office..... 1, 146.05

SUMMARY OF GENERAL-FUND TRANSACTIONS.

Cash receipts:

General work.....	\$103,026.23
First-aid department.....	17,427.45
Nursing service.....	269.00
New York office.....	0.00

Total..... 120,722.68

Balance in general fund Jan. 1, 1913..... 25,722.90

146,445.58

Cash payments:

General work.....	58,414.69
First-aid department.....	28,135.71
Nursing service.....	2,999.57
New York office.....	1,146.05

Total..... 90,696.02

Balance in general fund Dec. 31, 1913:

In hands of treasurer.....	\$55,260.45
In hands of fiscal officers.....	489.11
	55,749.56

146,445.58

NET REVENUE UNDER THE GENERAL FUND.

Total receipts.....	\$120,722.68
From which total of receipts deduct amount representing refundments to the Red Cross of items of expenditure.....	47.17

120,675.51

Less refundments made from these receipts by the Red Cross..... 11.30

Net revenue..... 120,664.21

NET EXPENDITURES UNDER THE GENERAL FUND.

Total payments.....	\$90,696.02
From which total of payments deduct amount representing refundments by the Red Cross of items of revenue.....	11.30

90,684.72

Less refundments made to the Red Cross in these payments..... 47.17

Net expenditures..... 90,637.55

*Contingent relief fund.***FUND RECEIPTS.**

Contributions.....	\$1,062.80
Refundments, relief incident to Mexican insurrection.....	1,729.19
Total cash receipts.....	2,791.99
Transferred from other funds:	
Chinese famine relief fund.....	\$19,200.40
Balkan War relief fund.....	3,774.28
Mississippi River flood relief fund.....	20,440.66
Washington Place factory fire fund.....	19,148.16
	62,563.50
Total.....	65,355.49
Balance in contingent relief fund, Jan. 1, 1913.....	12,845.74
Total.....	78,201.23

FUND PAYMENTS.

Relief incident to Mexican insurrection.....	\$22,180.98
Smallpox outbreak, Carbo, Mexico.....	19.50
Suffering in Nicaragua.....	11.25
Sufferers from fire at Hot Springs, Ark.....	1,042.90
Texas-flood sufferers.....	5,000.00
Dawson, Tex., mine explosion.....	8.00
Flood sufferers in Kentucky.....	500.00
Horse show, Washington, D. C.....	13.34
Cincinnati mine disaster.....	2,342.87
Fiftieth anniversary, Battle of Gettysburg.....	4,403.17
Storm and flood, Nome, Alaska.....	500.00
Supplies for Kodiak and Afognak Islands, Alaska.....	250.46
Steamship <i>Volturno</i> disaster.....	5,000.00
Seed for destitute Turks.....	100.00
Suffering in Italy.....	10.00
Balkan War relief:	
Bulgaria.....	\$250
Servia.....	250
	500.00
Total cash payments.....	41,882.47
Transferred to other funds: Second Balkan War relief fund.....	345.43
Total.....	42,227.90
Balance in contingent relief fund, Dec. 31, 1913:	
In hands of treasurer.....	\$33,310.98
In hands of fiscal officers.....	2,662.35
	35,973.33
Total.....	78,201.23

NET REVENUE UNDER THE CONTINGENT RELIEF FUND.

Total cash receipts.....	\$2,791.99
From which total of receipts deduct amount representing refundments to the Red Cross of items of expenditure.....	1,729.19
Net revenue.....	1,062.80

NET EXPENDITURES UNDER THE CONTINGENT RELIEF FUND.

Total cash payments.....	\$41,882.47
Less refundments in these payments made to the Red Cross.....	1,729.19
Net expenditures.....	40,153.28

Rural nursing fund.

FUND RECEIPTS.

Contributions (total cash receipts).....	\$2, 316. 00
Transferred from other funds: Deposits by communities for salaries of rural nurses.....	193. 00
Total.....	2, 509. 00
Balance in rural nursing fund Jan. 1, 1913.....	5, 564. 13
	8, 073. 13

FUND PAYMENTS.

Personal services:	
Superintendent.....	\$2, 000. 00
Clerks, superintendent's office.....	512. 78
Rural nurses.....	299. 33
Miscellaneous personal services.....	68. 60
Services other than personal:	
Transportation of persons.....	413. 68
Transportation of things—	
Freight.....	. 90
Express.....	79. 98
Subsistence and support of persons.....	190. 69
Communication service:	
Telegraph.....	52. 23
Telephone.....	30. 71
Messenger.....	. 60
Postage.....	130. 83
Printing, engraving, lithographing, binding.....	173. 50
Advertisements.....	2. 00
Contingent office expenses.....	19. 62
Scholarships.....	312. 50
Miscellaneous services other than personal.....	5. 00
Supplies:	
Stationery.....	273. 78
Office supplies.....	51. 69
Photographic supplies.....	34. 95
Wearing apparel.....	15. 00
Medals, badges, ribbons.....	81. 00
Equipment:	
Furniture and fixtures.....	80. 20
Office equipment.....	15. 85
Educational equipment.....	871. 90
Library stock.....	4. 00
Maintenance:	
Repairs to furniture and fixtures.....	3. 25
Repairs to typewriters.....	12. 00
Fixed charges:	
Rent of offices.....	180. 00
Rent of typewriters.....	1. 50
Total cash payments.....	5, 918. 07
Balance in rural nursing fund Dec. 31, 1913:	
In hands of treasurer.....	\$1, 856. 06
In hands of fiscal officers.....	299. 00
	2, 155. 06
	8, 073. 13

NET REVENUE UNDER RURAL NURSING FUND.

Total cash receipts (from which there are no deductions)..... \$2, 316. 00

NET EXPENDITURES UNDER RURAL NURSING FUND.

Total cash payments (from which there are no deductions)..... \$5, 918. 07

*Chinese famine relief fund.***FUND RECEIPTS.**

Contributions (total cash receipts).....	\$176. 72
Balance in Chinese famine relief fund, Jan. 1, 1913	21, 638. 41
	21, 815. 13

FUND PAYMENTS.

Salary and expenses of civil engineer investigating conditions in China (total cash payments).....	\$1, 000. 00
Transferred to other funds, contingent relief fund.....	19, 200. 40
Total.....	20, 200. 40
Balance in Chinese famine relief fund, Dec., 31, 1913, in hands of treasurer..	1, 614. 73
	21, 815. 13

NET REVENUE UNDER CHINESE FAMINE RELIEF FUND.

Total cash receipts (from which there are no deductions).....	\$176. 72
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NET EXPENDITURES UNDER THE CHINESE FAMINE RELIEF FUND.

Total cash payments (from which there are no deductions).....	\$1, 000. 00
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*"Titanic" wreck fund.***FUND RECEIPTS.**

Deposited by emergency relief committee, New York, N. Y. (total cash receipts).....	\$1, 400. 00
Balance in <i>Titanic</i> wreck fund, Jan. 1, 1913.....	543. 75
Total.....	1, 943. 75

FUND PAYMENTS.

Relief (total cash payments).....	\$793. 75
Balance in <i>Titanic</i> wreck fund, Dec. 31, 1913, in hands of treasurer.....	1, 150. 00
	1, 943. 75

NET REVENUE UNDER THE "TITANIC" WRECK FUND.

Total cash receipts (from which there are no deductions).....	\$1, 400. 00
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NET EXPENDITURES UNDER THE "TITANIC" WRECK FUND.

Total cash payments (from which there are no deductions).....	\$793. 75
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*Washington Place factory fire fund.***FUND RECEIPTS.**

Contributions (total cash receipts).....	\$100. 00
Balance in Washington Place factory fire fund Jan. 1, 1913.....	19, 048. 16
	19, 148. 16

FUND PAYMENTS.

Transferred to other funds: Contingent relief fund.....	\$19, 148. 16
Leaving no balance in this fund Dec. 31, 1913.	

NET REVENUES UNDER WASHINGTON PLACE FACTORY FIRE FUND.

Total cash receipts (from which there are no deductions).....	\$100
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NET EXPENDITURES UNDER WASHINGTON PLACE FACTORY FIRE FUND.

No cash payments from this fund.

*Mississippi River flood fund.***FUND RECEIPTS.**

Contributions (total cash receipts).....	\$2,000.00
Balance in Mississippi River flood fund, Jan. 1, 1913.....	68,440.66

70,440.66

FUND PAYMENTS.

Relief operations (total cash payments).....	\$20,000.00
Transferred to other funds: Contingent relief fund.....	20,440.66
Balance in Mississippi River flood fund, Dec. 31, 1913: In hands of fiscal officers.....	30,000.00

70,440.66

NET REVENUE UNDER MISSISSIPPI RIVER FLOOD FUND.

Total cash receipts (from which there are no deductions).....	\$2,000.00
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NET EXPENDITURES UNDER MISSISSIPPI RIVER FLOOD FUND.

Total cash payments (from which there are no deductions).....	\$20,000.00
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*Balkan war relief fund.***FUND RECEIPTS.****Contributions:****For—**

Greece.....	\$4,826.76
Servia.....	53.26
Bulgaria.....	157.00
Turkey.....	842.56
Montenegro.....	12.00
Balkan allies.....	50.00
General use.....	3,057.77

Total cash receipts.....	8,999.35
Balance in Balkan War relief fund, Jan. 1, 1913.....	1,761.48

10,760.83

FUND PAYMENTS.**Relief:****For—**

Greece.....	\$3,584.55
Servia.....	500.00
Turkey.....	2,902.00

Total cash payments.....	6,986.55
Transferred to other funds: Contingent relief fund.....	3,774.28

Total.....	10,760.83
Leaving no balance in this fund December 31, 1913.	

NET REVENUE UNDER BALKAN WAR RELIEF FUND.

Total cash receipts (from which there are no deductions).....	\$8,999.35
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NET EXPENDITURES UNDER BALKAN WAR RELIEF FUND.

Total cash payments (from which there are no deductions).....	\$6,986.55
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Second Balkan War relief fund.

FUND RECEIPTS.

Contributions:

For—

Greece.....	\$1,172. 98
Servia.....	289. 01
Bulgaria.....	80. 65
Macedonia.....	10. 00
General use.....	581. 97

Total cash receipts.....	2,114. 61
Transferred from other funds—Contingent relief fund.....	345. 43
Total.....	2,460. 04

FUND PAYMENTS.

Relief:

For—

Greece.....	\$1,372. 98
Servia.....	868. 03
Bulgaria.....	219. 03

Total cash payments.....	2,460. 04
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Leaving no balance in this fund December 31, 1913.

NET REVENUE UNDER SECOND BALKAN WAR RELIEF FUND.

Total cash receipts (from which there are no deductions).....	\$2,114. 61
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NET EXPENDITURES UNDER SECOND BALKAN WAR RELIEF FUND.

Total cash payments (from which there are no deductions).....	\$2,460. 04
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Storm and flood relief fund, 1913.

FUND RECEIPTS.

Contributions.....	\$1,975,247. 50
Refundments, relief operations.....	55,342. 50

Total cash receipts.....	2,030,590. 00
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FUND PAYMENTS.

Relief operations.....	\$1,398,478. 38
Protest fees on returned dishonored checks.....	3. 67
New York office expenses.....	121. 00
Report of relief work in Red Cross Magazine.....	2,116. 83
Refundments, contributions.....	2,459. 05

Total cash payments.....	1,403,178. 93
Balance in storm and flood relief (1913 fund) Dec. 31, 1913:	
In hands of treasurer.....	\$604,661. 07
In hands of fiscal officers.....	22,750. 00
	627,411. 07
	2,030,590. 00

NET REVENUE UNDER STORM AND FLOOD RELIEF FUND, 1913.

Total cash receipts.....	\$2,030,590. 00
From which total of receipts deduct amount representing refundments to the Red Cross of items of expenditure.....	55,342. 50
	1,975,247. 50
Less refundments made from these receipts by the Red Cross.....	2,459. 05
Net revenue.....	1,972,788. 45

NET EXPENDITURES UNDER STORM AND FLOOD RELIEF FUND, 1913.

Total cash payments.....	\$1, 403, 178. 93
From which total of payments deduct amount representing refundments by the Red Cross of items of revenue.....	2, 459. 05
Less refundments made to the Red Cross in these payments.....	1, 400, 719. 88
	55, 342. 50
Net expenditures.....	1, 345, 377. 38

Cincinnati mine-disaster relief fund.

FUND RECEIPTS.

Contributions.....	\$3. 00
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FUND PAYMENTS.

No payments were paid from this fund during the year.

Balance in Cincinnati mine-disaster relief fund Dec. 31, 1913: In hands of treasurer.....	\$3. 00
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NET REVENUE UNDER CINCINNATI MINE-DISASTER RELIEF FUND.

Total cash receipts.....	\$3. 00
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NET EXPENDITURES UNDER CINCINNATI MINE-DISASTER RELIEF FUND.

No expenditures.

Deposits by communities for salaries of rural nurses.

FUND RECEIPTS.

Deposits by various communities for salaries of rural nurses (total cash receipts).....	\$2, 308. 79
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FUND PAYMENTS.

Salaries of rural nurses in various communities.....	\$2, 045. 55
Refundments, deposits by various communities for salaries of rural nurses.....	70. 24
Total cash payments.....	2, 115. 79
Transferred to other funds: Rural nursing fund.....	193. 00
	2, 308. 79

NET REVENUE UNDER DEPOSITS BY COMMUNITIES FOR SALARIES OF RURAL NURSES.

Total cash receipts.....	\$2, 308. 79
Less refundments made from these receipts by the Red Cross.....	70. 24
Net revenue.....	2, 238. 55

NET EXPENDITURES UNDER DEPOSITS BY COMMUNITIES FOR SALARIES OF RURAL NURSES.

Total cash payments.....	\$2, 115. 79
From which total of payments deduct amount representing refundments by the Red Cross of items of revenue.....	70. 24
Net expenditures.....	2, 045. 55

Endowment fund.

FUND RECEIPTS.

Contributions.....	\$2, 331. 10
Life membership dues.....	400. 00
Total cash receipts.....	2, 731. 10

FUND PAYMENTS.

Transmitted to trustees of the endowment fund (total cash payments).... \$2,731.10
 Leaving no balance in this fund Dec. 31, 1913.

NET REVENUE UNDER THE ENDOWMENT FUND.

Total cash receipts (from which there are no deductions)..... \$2,731.10

NET EXPENDITURES UNDER THE ENDOWMENT FUND.

Total cash payments (from which there are no deductions)..... \$2,731.10

Cash account—All funds.

TREASURER.

Balances of cash, all funds, in hands of treasurer, Jan. 1, 1913.....	\$103,968.00	
Receipts of cash, all funds, during 1913..	\$2,176,254.24	
Repayments by fiscal officers of unexpended advances, all funds.....	2,279.27	
	<u>2,178,533.51</u>	\$2,282,501.51
Payments of cash, all funds, during 1913.....	1,537,267.52	
Advances to fiscal officers, all funds, during 1913.....	47,377.70	
	<u>1,584,645.22</u>	
Balance, all funds, Dec. 31, 1913.....		697,856.29

FISCAL OFFICERS.

Balances of cash, all funds, in hands of fiscal officers, Jan. 1, 1913.....	\$51,597.23	
Advances of cash, all funds, received from treasurer during 1913.....	47,377.70	
	<u>\$98,974.93</u>	
Payments of cash, all funds, during 1913.....	40,495.20	
Repayments to treasurer of unexpended advances, all funds, during 1913.....	2,279.27	
	<u>42,774.47</u>	
Balance, all funds, Dec. 31, 1913.....		56,200.46
Total balance of cash, all funds, Dec. 31, 1913:		
In hands of treasurer.....		697,856.29
In hands of fiscal officers.....		56,200.46
		<u>754,056.75</u>

Reconciliation of treasurer's bank balances.

The following voucher checks drawn on Riggs National Bank, Washington, D. C., are outstanding at the close of December 31, 1913:

No. 2597.....	\$24.00	No. 4780.....	\$2.23
No. 4467.....	5.00	No. 4781.....	105.50
No. 4690.....	37.50	No. 4784.....	45.00
No. 4724.....	78.98	No. 4785.....	125.00
No. 4755.....	5.00	No. 4786.....	83.40
No. 4766.....	6.00	No. 4787.....	75.00
No. 4772.....	80.40	No. 4788.....	25.00
No. 4773.....	8.00	No. 4789.....	25.00
No. 4775.....	5.50	No. 4790.....	50.00
No. 4776.....	16.41	No. 4791.....	4.79
No. 4777.....	9.00	No. 4792.....	14.10
No. 4778.....	11.70		
No. 4779.....	3.67	Total.....	846.18

None of the voucher checks drawn on the American Security & Trust Co., Washington, D. C., are outstanding at the close of December 31, 1913.

Riggs National Bank:

Balance as per bank pass book \$329, 970. 73
 Less checks outstanding, as above 846. 18

Treasurer's cash account balance \$329, 124. 55
 American Security & Trust Co.:

Balance as per bank pass book (no checks outstanding).... 368, 731. 74

Treasurer's cash account balance 368, 731. 74

Total cash balance 697, 856. 29

List of fiscal officers' fund balances Dec. 31, 1913.

Name.	Fund.	Amount.
Sara M. F. Babb.....	Rural nursing.....	\$50. 00
E. P. Bicknell.....	(General.....	273. 53
	(Contingent relief.....	332. 00
	(Storm and flood relief.....	20, 500. 00
		21, 105. 53
C. R. Byrnes.....	Mississippi River flood.....	5, 000. 00
J. V. Cameron.....	General.....	58. 11
F. F. Clement.....	Rural nursing.....	100. 00
Harry Coope.....	Storm and flood relief.....	250. 00
J. B. Deacon.....	Contingent relief.....	300. 00
E. T. Divine.....	Storm and flood relief.....	1, 000. 00
El Paso (Tex.) chapter.....	Contingent relief.....	1, 500. 00
John G. Gannon.....	Mississippi River flood.....	25, 000. 00
C. M. Hubbard.....	Storm and flood relief.....	500. 00
L. H. Levin.....	do.....	50. 00
C. L. Magee.....	(General.....	126. 17
	(Contingent relief.....	45. 00
		171. 17
W. M. McGrath.....	do.....	300. 00
S. P. Morris.....	Storm and flood relief.....	200. 00
M. A. Pace.....	Rural nursing.....	100. 00
E. L. Parker.....	do.....	49. 00
Maj. R. U. Patterson.....	(General fund.....	32. 30
	(Contingent relief.....	135. 35
		167. 65
F. Simpich.....	do.....	50. 00
G. R. Taylor.....	Storm and flood relief.....	250. 00
DUE FROM RED CROSS TO FISCAL OFFICERS.		
T. N. Phillips.....	General.....	1. 00

Fiscal officers' accountable balances, as above \$56, 201. 46
 Less amount due to fiscal officers, as above 1. 00

Net balances 56, 200. 46

Supplement to treasurer's report for 1913.

	Balance Jan. 1, 1913.	Receipts.	Payments.	Balance Dec. 31, 1913.
MINNESOTA FOREST FIRE ACCOUNT.				
Kenneth Clark, treasurer, Minnesota Red Cross State board.....	\$9,701.60	.....	.....	\$9,701.60
TITANIC WRECK ACCOUNT.				
Jacob H. Schiff, treasurer, New York County chapter..	37,468.43	\$639.41	\$38,107.84	.....
WASHINGTON PLACE FACTORY FIRE ACCOUNT.				
Jacob H. Schiff, treasurer, New York County chapter..	100.00	.....	100.00	.....
MISSISSIPPI RIVER FLOOD ACCOUNT.				
Joseph T. Howell, treasurer, Tennessee Red Cross State board.....	1,778.21	909.92	690.15	1,995.98
Walker Hill, treasurer, Missouri Red Cross State board.	9,135.03	90.00	.....	9,225.03
John J. Gannon, treasurer, Louisiana Red Cross State board.....	25,000.00	.....	20,058.32	4,941.68

O

TREATY ITEMS, INDIAN APPROPRIATION BILL.

LETTER FROM THE ASSISTANT COMMISSIONER OF INDIAN
AFFAIRS SUBMITTING INFORMATION RELATIVE TO EXISTING
TREATIES BETWEEN VARIOUS INDIAN TRIBES AND THE UNITED
STATES.

JUNE 11, 1914.—Ordered to be printed.

DEPARTMENT OF THE INTERIOR,
OFFICE OF INDIAN AFFAIRS,
Washington, June 2, 1914.

MY DEAR MR. STEPHENS: In response to your letter of May 27, requesting certain information for the use of your committee regarding the various treaties between the United States and Indian tribes, I have the honor to invite your attention to office letter dated August 25, 1913, covering the subjects stated in your letter.

As the treaty items in the pending bill are practically the same as those contained in the 1914 Indian act, I am inclosing two copies of the report of August 25, 1913, referred to, and trust that the information contained therein will serve the present needs of the committee.

Very truly, yours,

E. B. MERITT,
Assistant Commissioner.

Hon. JOHN H. STEPHENS,
*Chairman Committee on Indian Affairs,
House of Representatives.*

DEPARTMENT OF THE INTERIOR,
OFFICE OF INDIAN AFFAIRS,
Washington, August 25, 1913.

Hon. JOHN H. STEPHENS,
*Chairman Committee on Indian Affairs,
House of Representatives.*

MY DEAR MR. STEPHENS: In further compliance with your favor of July 7 requesting information for the use of your committee as to the date of each treaty on which an appropriation is based in the Indian appropriation act, whether the treaty has expired or is still in force and how long said treaty is to remain in force and effect, I have the honor to transmit herewith a copy of the Indian appropriation act approved June 30, 1913, in which the treaty items are

numbered in the order in which they appear in the act. They are considered in this letter in their regular order, as follows:

1. The appropriation of \$100,000 appearing on page 10 of the Indian appropriation act for the purpose of providing school facilities for the children of the Navajo Tribe of Indians is based on the sixth article of the treaty of June 1, 1868 (15 Stat. L., 667), ratified July 25, 1868, and proclaimed August 12, 1868. Article 6 of this treaty reads as follows:

In order to insure the civilization of the Indians entering into this treaty, the necessity of education is admitted, especially of such of them as may be settled on said agricultural parts of this reservation, and they therefore pledge themselves to compel their children, male and female, between the ages of six and sixteen years, to attend school; and it is hereby made the duty of the agent for said Indians to see that this stipulation is strictly complied with; and the United States agrees that, for every thirty children between said ages who can be induced or compelled to attend school, a house shall be provided, and a teacher competent to teach the elementary branches of an English education shall be furnished, who will reside among said Indians, and faithfully discharge his or her duties as a teacher.

The provisions of this article to continue for not less than ten years.

Subsequent to the date of this treaty, Congress for a number of years provided limited appropriations in pursuance of article 6 of said treaty. The inadequacy of these appropriations is apparent in the following item found in the Indian appropriation act of May 11, 1880 (21 Stat. L., 114, 121):

For last of ten installments, for pay of two teachers, per sixth article of treaty of June first, eighteen hundred and sixty-eight, two thousand dollars.

According to the best obtainable information, there are approximately 7,000 reservation and nonreservation Navajo Indian children of school age, and of this number about 1,750 are in reservation, non-reservation, and mission schools, leaving between 4,000 and 5,000 Navajo Indian children without school facilities.

It is believed that the Government is under moral obligations to provide adequate school facilities for the Navajo Indian children.

These Indians have been greatly neglected, and a large majority of the children are growing up in ignorance, and unless the Government does its part in preparing them for the duties of citizenship they will eventually become a burden to the citizens of the States in which they reside.

Notwithstanding that the Congress has heretofore made limited appropriations in pursuance of the provisions of article 6 of the treaty of June 1, 1868, supra, I am of the opinion that a specific appropriation with which to provide adequate school facilities for the children of the Navajo Tribe of Indians should be continued for a number of years.

2. The next treaty item in the Indian act is found on page 11 and reads as follows:

For fulfilling treaty stipulations with the Bannocks in Idaho: For pay of physician, teacher, carpenter, miller, engineer, farmer, and blacksmith (article ten, treaty of July third, eighteen hundred and sixty-eight), \$5,000.

Article 10 of the treaty of July 3, 1868 (15 Stat. L., 673), reads:

The United States hereby agrees to furnish annually to the Indians the physician, teachers, carpenter, miller, engineer, farmer, and blacksmith, as herein contemplated, and that such appropriations shall be made from time to time, on the estimates of the Secretary of the Interior, as will be sufficient to employ such persons.

It will be seen that there is no limitation on this treaty provision, and that the appropriation is continued for such time as the Congress may deem proper.

3. The next treaty item reads:

For the Coeur d'Alenes in Idaho: For pay of blacksmith, carpenter, and physician, and purchase of medicines (article eleven, agreement ratified March third, eighteen hundred and ninety-one), \$3,000.

The agreement with the Coeur d'Alenes was ratified by the act of Congress of March 3, 1891 (26 Stat. L., 989-1029), and article 11 is as follows:

It is further agreed that in addition to the amount heretofore provided for the benefit of said Coeur d'Alene Indians the United States, at its own expense, will furnish and employ for the benefit of said Indians on said reservation a competent physician, medicines, a blacksmith, and carpenter.

This article of the treaty is without limitation as to time, and the appropriation is continued in the discretion of the Congress.

4. The next treaty item appears on page 12 of the Indian appropriation act, and reads as follows:

For fulfilling treaties with the Sacs and Foxes of the Missouri: For support of a school (article five, treaty of March sixth, eighteen hundred and sixty-one), \$200.

The fifth article of the treaty of March 6, 1861, ratified February 6, 1863, with the Sacs and Foxes of Missouri and Iowa, reads in part as follows (12 Stat. L., 1172):

In order to encourage education among the aforesaid tribes of Indians, it is hereby agreed that the United States shall expend the sum of one thousand dollars for the erection of a suitable schoolhouse and dwelling house for the school-teacher, for the benefit of the Sacs and Foxes, and also the additional sum of two hundred dollars per annum for school purposes, so long as the President of the United States may deem advisable.

It would appear that this treaty appropriation should be continued "so long as the President of the United States may deem advisable."

5. The next treaty item in the act reads:

For support of a school or schools for the Chippewas of the Mississippi in Minnesota (article three, treaty of March nineteenth, eighteen hundred and sixty-seven), \$4,000.

Article 3 of the treaty of March 19, 1867, with the Chippewas of the Mississippi, ratified March 8, 1867 (16 Stat. L., 719-720), is in part as follows:

In further consideration for the lands herein ceded, estimated to contain about two millions of acres, the United States agree to pay the following sums, to wit: Five thousand dollars for the erection of school buildings upon the reservation provided for in the second article; four thousand dollars each year for ten years, and as long as the President may deem necessary after the ratification of this treaty, for the support of a school or schools upon said reservation. * * *

It would appear from the language used in the treaty that this appropriation should be continued "as long as the President may deem necessary" after the ratification of the treaty.

6. The next treaty item is found on page 15 of the Indian appropriation act and reads as follows:

For fulfilling treaties with Crow, Montana: For pay of physician, \$1,200; and for pay of carpenter, miller, engineer, farmer, and blacksmith (article ten, treaty of May seventh, eighteen hundred and sixty-eight), \$3,600; for pay of second blacksmith (article eight, same treaty), \$1,200; in all, \$6,000.

The treaty of May 7, 1868, with the Crow Indians was ratified July 25, 1868 (15 Stat. L., 649). Article 10 of said treaty reads:

The United States hereby agrees to furnish annually to the Indians the physician, teachers, carpenter, miller, engineer, farmer, and blacksmiths as herein contemplated, and that such appropriations shall be made from time to time, on the estimates of the Secretary of the Interior, as will be sufficient to employ such persons.

Article 8 of the treaty mentioned provides, *inter alia*, that—

such persons as commence farming shall receive instructions from the farmer herein provided for; and whenever more than one hundred persons shall enter upon the cultivation of the soil a second blacksmith shall be provided, with such iron, steel, and other material as may be required.

There does not appear to be any limitation as to time the provisions of articles 8 and 10 of the treaty of May 7, 1868, are to continue in force.

7. The next treaty provision found in the act reads as follows:

For subsistence and civilization of the Northern Cheyennes and Arapahos (agreement with the Sioux Indians, approved February twenty-eighth, eighteen hundred and seventy-seven), including subsistence and civilization of the Northern Cheyennes removed from Pine Ridge Agency to Tongue River, Montana, and for pay of physician, two teachers, two carpenters, one miller, two farmers, a blacksmith, and engineer (article seven, treaty of May tenth, eighteen hundred and sixty-eight), \$85,000.

The agreement with the different bands of the Sioux Nation of Indians, and also with the Northern Cheyenne and Arapaho Indians, dated September 26, 1878, was ratified by the act of February 28, 1877 (19 Stat. L., 254). The treaty of May 10, 1868, with the Northern Cheyenne and Northern Arapaho Indians was ratified July 25, 1868 (15 Stat. L., 655).

In the fifth article of the agreement of February 28, 1877, the United States agrees to provide all necessary aid to assist the Indians in the work of civilization and to furnish subsistence and certain specified rations. No amount is mentioned or specified period fixed.

By article 7 of the treaty of May 10, 1868, *supra*, the United States agrees to furnish annually to the Indians who settled upon the reservation a physician, teachers, carpenter, miller, engineer, farmer, and blacksmiths, as contemplated in said agreement, and that such appropriations shall be made from time to time, on the estimates of the Secretary of the Interior, as will be sufficient to employ such persons, and no limitations in time is found in article 7 of the treaty in question.

8-9. The treaty items for the benefit of the New York Indians are found on page 17 of the act, and read as follows

For fulfilling treaties with Senecas of New York: For permanent annuity in lieu of interest on stock (act of February nineteenth, eighteen hundred and thirty-one), \$6,000.

For fulfilling treaties with Six Nations of New York: For permanent annuity, in clothing and other useful articles (article six, treaty of November eleventh, seventeen hundred and ninety-four), \$4,500.

Section 1 of the act of February 19, 1831 (4 Stat. L., 442), entitled "An act to provide hereafter for the payment of six thousand dollars annually to the Seneca Indians, and for other purposes," reads as follows:

That the proceeds of the sum of one hundred thousand dollars, being the amount placed in the hands of the President of the United States, in trust, for the Seneca Tribe of Indians, situated in the State of New York, be hereafter passed to the credit of the Indian appropriation fund; and that the Secretary of War be authorized to receive and

pay over to the Seneca Tribe of Indians the sum of six thousand dollars, annually, in the way and manner as heretofore practiced, to be paid out of any money in the Treasury not otherwise appropriated.

Article 6 of the treaty of November 11, 1794 (7 Stat. L., 44), with the Six Nations of New York provides:

In consideration of the peace and friendship hereby established, and of the engagements entered into by the Six Nations; and because the United States desire, with humanity and kindness, to contribute to their comfortable support; and to render the peace and friendship hereby established strong and perpetual; the United States now deliver to the Six Nations, and the Indians of the other nations residing among and united with them, a quantity of goods of the value of ten thousand dollars. And for the same considerations, and with a view to promote the welfare of the Six Nations, and of their Indian friends aforesaid, the United States will add the sum of three thousand dollars to the one thousand five hundred dollars heretofore allowed them by an article ratified by the President on the twenty-third day of April, 1792; making, in the whole, four thousand five hundred dollars; which shall be expended yearly forever in purchasing clothing, domestic animals, implements of husbandry, and other utensils suited to their circumstances, and in compensating useful artificers who shall reside with or near them, and be employed for their benefit.

It will be seen from the foregoing that the treaty items in question are permanent, but these annuities may be commuted under the provisions contained in the act of April 30, 1908 (35 Stat. L., 70-73), reading as follows:

That the Commissioner of Indian Affairs is hereby authorized to send a special Indian agent, or other representative of his office, to visit any Indian tribe for the purpose of negotiating and entering into a written agreement with such tribe for the commutation of the perpetual annuities due under treaty stipulations, to be subject to the approval of Congress; and the Commissioner of Indian Affairs shall transmit to Congress said agreements with such recommendations as he may deem proper.

10. The next treaty item is for the benefit of the Pawnees of Oklahoma, found on page 19 of the act, and reads:

For fulfilling treaties with the Pawnees, Oklahoma: For perpetual annuity, to be paid in cash to the Pawnee (article three, agreement of November twenty-third, eighteen hundred and ninety-two), \$30,000; for support of two manual-labor schools (article three, treaty of September twenty-fourth, eighteen hundred and fifty-seven), \$10,000; for pay of one farmer, two blacksmiths, one miller, one engineer and apprentices, and two teachers (article four, same treaty), \$5,400; for purchase of iron and steel and other necessities for the shops (article four, same treaty), \$500; for pay of physician and purchase of medicines, \$1,200; in all \$47,100.

The agreement of November 23, 1892, with the Pawnees, was ratified by section 12 of the act of March 3, 1893 (27 Stats. L., 644). The treaty of September 24, 1857, was proclaimed by the President on May 26, 1858 (11 Stats. L., 729).

The third article of the agreement of November 23, 1892, amends article 2 of the treaty of 1857 so as to read:

The United States agrees to pay to the Pawnees the sum of \$30,000 per annum, as a perpetual annuity, to be distributed annually among them per capita, in coin, unless the President of the United States shall from time to time otherwise direct. But it is further agreed that the President may, at any time, in his discretion, discontinue said perpetuity by causing the value of a fair commutation thereof to be paid to or expended for the benefit of said Indians in such manner as to him shall seem proper. (See Senate Ex. Doc. No. 16, 52d Cong., 2d sess.)

Article 3 of the treaty of 1857 provides for two manual-labor schools, and provides further that—

the United States agree to furnish suitable houses and farms for said schools, and whatever else may be necessary to put them in successful operation; and a sum not less than five thousand dollars per annum shall be applied to the support of each school

so long as the Pawnees shall, in good faith, comply with the provisions of this article; but if at any time the President is satisfied they are not doing so, he may, at his discretion, discontinue the schools in whole or in part.

In article 4 of the same treaty (11 Stat. L., 730) the United States agrees to furnish the Pawnees: First, certain tools, erect shops, also furnish \$500 annually, during the pleasure of the President, for the purchase of iron, steel, and other necessaries, and also to furnish two blacksmiths; second, to furnish farming utensils and stock worth \$1,200 annually for 10 years, or during the pleasure of the President, and also to employ a farmer to teach the Indians the arts of agriculture; third, to have erected a steam mill not to exceed in cost \$6,000, and to keep the same in repair for 10 years, and also to employ a miller and engineer for the same length of time, or longer, at the discretion of the President.

There is no provision in article 4 for teachers, but article 3 provides that the manual-labor schools authorized therein shall be governed by such rules and regulations as may be prescribed by the President of the United States.

It appears from the foregoing that the \$30,000 appropriation in the treaty item for the Pawnees is a perpetual annuity, but may be commuted under the act of April 30, 1908 (35 Stat. L., 70-73).

The other treaty appropriations in favor of the Pawnees are not perpetual and may be discontinued in the discretion of the President and the Congress.

11. The treaty appropriation in favor of the Quapaws of Oklahoma is found on page 19 of the Indian act, and reads:

For support of Quapaws, Oklahoma: For education (article three, treaty of May thirteenth, eighteen hundred and thirty-three), \$1,000; for blacksmith and assistants, and tools, iron and steel for blacksmith shop (same article and treaty), \$500; in all, \$1,500: *Provided*, That the President of the United States shall certify the same to be for the best interests of the Indians.

Article 3 of the treaty of May 13, 1833 (7 Stat. L., 424), with the Quapaws reads in part as follows:

The United States agree to provide a farmer to reside with them and to aid and instruct them in their agricultural pursuits and a blacksmith to do their necessary work, with a shop and tools and iron and steel not exceeding one ton per year. The United States also agree to appropriate one thousand dollars per year for education purposes to be expended under the direction of the President of the United States; the farmer and blacksmith and the above appropriation for education purposes to be continued only as long as the President of the United States deems necessary for the best interests of the Indians.

The treaty appropriation in favor of the Quapaws is not a perpetual annuity, but it is believed that the appropriation should "be continued as long as the President of the United States deems it necessary for the best interests of the Indians."

12. The treaty appropriation for the Choctaws of Oklahoma is found on page 22 of the Indian appropriation act, and reads as follows:

For fulfilling treaties with Choctaws, Oklahoma: For permanent annuity (article two, treaty of November sixteenth, eighteen hundred and five, and article thirteen, treaty of June twenty-second, eighteen hundred and fifty-five), \$3,000; for permanent annuity for support of light-horsemen (article thirteen, treaty of October eighteenth, eighteen hundred and twenty, and article thirteen, treaty of June twenty-second, eighteen hundred and fifty-five); \$600; for permanent annuity for support of blacksmith (article six, treaty of October eighteenth, eighteen hundred and twenty, and article nine, treaty of January twentieth, eighteen hundred and twenty-five,

and article thirteen, treaty of June twenty-second, eighteen hundred and fifty-five), \$600; for permanent annuity for education (article two, treaty of January twentieth, eighteen hundred and twenty-five, and article thirteen, treaty of June twenty-second, eighteen hundred and fifty-five), \$6,000; for permanent annuity for iron and steel (article nine, treaty of January twentieth, eighteen hundred and twenty-five, and article thirteen, treaty of June twenty-second, eighteen hundred and fifty-five), \$320; in all, \$10,520.

The above treaty provisions with the Choctaw Nation are permanent, and appropriations by Congress should be provided annually until the perpetual annuities of the Choctaw Nation are commuted as authorized in the act of April 30, 1908. (35 Stat. L., 70-73.)

13. The treaty provisions appearing on pages 24 and 25 of the Indian appropriation act, in favor of the different tribes of the Sioux Nation, read as follows:

For support of Sioux of different tribes, including Santee Sioux of Nebraska, North Dakota, and South Dakota: For pay of five teachers, one physician, one carpenter, one miller, one engineer, two farmers, and one blacksmith (article thirteen, treaty of April twenty-ninth, eighteen hundred and sixty-eight), \$10,400; for pay of second blacksmith, and furnishing iron, steel, and other material (article eight of same treaty), \$1,600; for pay of additional employees at the several agencies for the Sioux in Nebraska, North Dakota, and South Dakota, \$95,000; for subsistence of the Sioux other than the Rosebud, Cheyenne River, and Standing Rock Tribes, and for purposes of their civilization (act of February twenty-eighth, eighteen hundred and seventy-seven), \$200,000: *Provided*, That this sum shall include transportation of supplies from the termination of railroad or steamboat transportation, and in this service Indians shall be employed whenever practicable; in all, \$307,000.

Article 13 of the treaty of April 29, 1868, with the Sioux Indians (15 Stat. L., 635-640) reads:

The United States hereby agrees to furnish annually to the Indians the physician, teachers, carpenter, miller, engineer, farmer, and blacksmiths, as herein contemplated, and that such appropriations shall be made from time to time, on the estimates of the Secretary of the Interior, as will be sufficient to employ such persons.

Article 8 of the same treaty provides in part as follows:

And it is further stipulated that such persons as commence farming shall receive instruction from the farmer herein provided for, and whenever more than one hundred persons shall enter upon the cultivation of the soil, a second blacksmith shall be provided, with such iron, steel, and other material as may be needed.

The appropriation in favor of the Sioux above quoted contains an item of \$200,000 "for subsistence and civilization of the Sioux other than the Rosebud, Cheyenne River, and Standing Rock Tribes." (Act of Feb. 28, 1877; 19 Stat. L., 254.) Said act ratifies the "Black Hills agreement," in the fifth article of which the United States agrees to provide all necessary aid to assist the Indians in the work of civilization and to furnish subsistence and certain specific rations.

There appears to be no specific limitation or period of time for which these treaty provisions are to be continued, it being a matter within the discretion of the Congress.

14. The next provision in the Indian appropriation act, found on page 25, in favor of the Sioux Indians, and in the form of a treaty provision, reads:

For support and maintenance of day and industrial schools among the Sioux Indians, including the erection and repair of school buildings, \$200,000, to be expended under the agreement with said Indians in section seventeen of the act of March second, eighteen hundred and eighty-nine, which agreement is hereby extended to and including June thirtieth, nineteen hundred and fourteen.

The agreement with the Sioux Nation of Indians contained in the act of March 2, 1889 (25 Stat. L., 888), was accepted by the Sioux

Nation and proclaimed by the President February 10, 1890. (26 Stat. L., 1554.) Section 17 of the act of March 2, 1889, *supra*, reads in part as follows:

That it is hereby enacted that the seventh article of the said treaty of April twenty-ninth, eighteen hundred and sixty-eight, securing to said Indians the benefits of education, subject to such modifications as Congress shall deem most effective to secure to said Indians equivalent benefits of such education, shall continue in force for twenty years from and after the time this act shall take effect * * *.

Article 7 of the treaty of April 29, 1868 (15 Stat. L., 635-637), reads as follows:

In order to insure the civilization of the Indians entering into this treaty, the necessity of education is admitted, especially of such of them as are or may be settled on said agricultural reservations, and they therefore pledge themselves to compel their children, male and female, between the ages of six and sixteen years, to attend school; and it is hereby made the duty of the agent for said Indians to see that this stipulation is strictly complied with; and the United States agrees that for every thirty children between said ages who can be induced or compelled to attend school, a house shall be provided and a teacher competent to teach the elementary branches of an English education shall be furnished, who will reside among said Indians and faithfully discharge his or her duties as a teacher. The provisions of this article to continue for not less than twenty years.

In the Indian appropriation act of April 4, 1910 (36 Stat. L., 284), the agreement in section 17 of the act of March 2, 1889, *supra*, was extended to and including June 30, 1911, and has been similarly extended in each subsequent Indian appropriation act. This treaty provision has expired by limitation, but the appropriation in question has been continued in the form of a treaty provision. The further continuation of this appropriation is within the discretion of the Congress.

15. The treaty provision in favor of the Confederated Bands of Ute Indians in Utah is found in page 26 of the Indian appropriation act and reads as follows:

For support and civilization of Confederated Bands of Utes in Utah: For pay of two carpenters, two millers, two farmers, and two blacksmiths (article fifteen, treaty of March second, eighteen hundred and sixty-eight), \$6,720; for pay of two teachers (same article and treaty), \$1,800; for purchase of iron and steel and the necessary tools for blacksmith shop (article nine, same treaty), \$220; for annual amount for the purchase of beef, mutton, wheat, flour, beans, and potatoes, or other necessary articles of food (article twelve, same treaty), \$30,000; for pay of employees at the several Ute agencies, \$15,000; in all, \$53,740.

Article 15 of the treaty with certain bands of Ute Indians concluded March 2, 1868 (15 Stat. L., 619-622), provides as follows:

The United States hereby agree to furnish the Indians the teachers, carpenters, millers, farmers, and blacksmiths, as herein contemplated, and that such appropriations shall be made from time to time, on the estimates of the Secretary of the Interior, as will be sufficient to employ such persons.

In article 9 of the same treaty it was agreed that an additional blacksmith to the one provided for in the treaty on October 7, 1863 (13 Stat. L., 675), should be provided, together with such iron, steel, and other material as may be needed for the Uintah, Yampa, and Grand River Agencies.

Article 12 of the same treaty reads as follows:

That an additional sum sufficient, in the discretion of Congress (but not to exceed thirty thousand dollars per annum), to supply the wants of said Indians for food, shall be annually expended under the direction of the Secretary of the Interior in supplying said Indians with beef, mutton, wheat, flour, beans, and potatoes, until such time as said Indians shall be found to be capable of sustaining themselves.

There does not appear to be any further provision in the articles of the treaty with the Ute Indians, referred to in the Indian appropriation act, as to the duration or expiration of the time during which the benefits are to be given, but article 10 of the treaty of March 2, 1868, *supra*, reads:

At any time after ten years from the making of this treaty, the United States shall have the privilege of withdrawing the farmers, blacksmiths, carpenters, and millers, herein and in the treaty of October seventh, one thousand eight hundred and sixty-three, referred to in article one of this treaty, provided for, but in case of such withdrawal, an additional sum thereafter of ten thousand dollars per annum shall be devoted to the education of said Indians, and the Commissioner of Indian Affairs shall, upon careful inquiry into their condition, make such rules and regulations, subject to the approval of the Secretary of the Interior, for the expenditure of said sum as will best promote the educational and moral improvement of said Indians.

It would appear from the foregoing that the continuation of the treaty benefits in favor of the Confederated Bands of Ute Indians is a matter within the discretion of the Congress.

16. The treaty item in the Indian appropriation act in favor of the Spokanes in Washington appears on page 26 and reads as follows:

For support of Spokanes in Washington (article six of agreement with said Indians, dated March eighteenth, eighteen hundred and eighty-seven, ratified by act of July thirteenth, eighteen hundred and ninety-two), \$1,000.

Article 6 of the agreement with the Spokanes in Washington, concluded March 18, 1887, ratified by the act of July 13, 1892 (27 Stat. L., 139), reads as follows:

It is further agreed that in addition to the foregoing provisions the United States shall employ and furnish a blacksmith and a carpenter to do necessary work and to instruct the Indians, parties hereto, in those trades. (Annual Report of the Commissioner of Indian Affairs, 1892, p. 744.)

The foregoing provisions referred to are for allotments of lands in severalty and an agreement to expend for the benefit of said Indians the sum of \$95,000, as follows: For the first year, \$30,000; for the second year, \$20,000; for each succeeding year thereafter, for eight years, \$5,000; said money to be expended under the direction of the Secretary of the Interior in the removal of the said Indians to the Coeur d'Alene Reservation, in erecting suitable houses, etc.

The last of the 10 installments was appropriated in the act of March 3, 1901 (31 Stat. L., 1070). The continuation of the treaty appropriation for the benefit of the Spokanes in Washington would appear to be within the discretion of the Congress, inasmuch as no definite period is mentioned in article 6 of the agreement in question.

17. The treaty item in favor of the Shoshones in Wyoming appears on page 29 of the Indian appropriation act, and reads as follows:

For support of Shoshones in Wyoming. For pay of teacher, physician, carpenter, miller, engineer, farmer, and blacksmith (article ten, treaty of July third, eighteen hundred and sixty-eight), \$5,000; for pay of second blacksmith, and such iron and steel and other materials as may be required, as per article eight, same treaty, \$1,000; in all, \$6,000.

Article 8 of the treaty with the Eastern Band of Shoshones and the Bannock Tribe of Indians, which was concluded July 3, 1868 (15 Stat. L., 673, 676), provides in part as follows:

And it is further stipulated that such persons as commence farming shall receive instruction from the farmers herein provided for, and whenever more than one hundred persons on either reservation shall enter upon the cultivation of the soil, a second blacksmith shall be provided, with such iron, steel, and other material as may be required.

Article 10 of said treaty provides:

The United States hereby agrees to furnish annually to the Indians the physician, teachers, carpenter, miller, engineer, farmer, and blacksmith, as herein contemplated, and that such appropriations shall be made from time to time, on the estimates of the Secretary of the Interior, as will be sufficient to employ such persons.

The first appropriation under these articles was made in the act of March 3, 1871 (16 Stat. L., 562). These appropriations have been made practically every year since the date last mentioned. The appropriation for the Bannock Indians is now found in the Indian appropriation act under "Idaho."

There does not appear to be any specified period of time in which these appropriations are to be continued. It is believed, therefore, that the matter is within the discretion of the Congress as to when they shall be discontinued.

If there is any additional information that I can furnish you in regard to the treaty items of the Indian appropriation act, I shall be glad if you will advise me, and I will take pleasure in complying with your request as promptly as possible.

Very truly, yours,

(Signed)

CATO SELLS,
Commissioner.

O

PARTIAL PAYMENTS ON PUBLIC CONTRACTS.

L E T T E R

FROM

THE ACTING SECRETARY OF COMMERCE,

TRANSMITTING

**DRAFT OF A BILL TO AUTHORIZE THE SECRETARY OF COMMERCE
TO MAKE PARTIAL PAYMENTS FOR WORK DONE UNDER PUBLIC
CONTRACTS AND PROVIDING FOR A LIEN ON ACCOUNT OF ALL
PAYMENTS MADE.**

JUNE 12, 1914.—Referred to the Committee on Interstate and Foreign Commerce
and ordered to be printed.

DEPARTMENT OF COMMERCE,
OFFICE OF THE SECRETARY,
Washington, June 10, 1914.

MY DEAR MR. SPEAKER: I have to inclose, with recommendation that the same be enacted into law, a draft of proposed legislation authorizing the Secretary of Commerce to make partial payments for work done under public contracts executed by this department, and providing for a lien, paramount to all other liens, on account of all payments made under such contracts.

Section 3648 of the Revised Statutes provides that payments under contracts for the performance of service or the delivery of articles shall not exceed the value of the service rendered or of the articles delivered previously to such payment. Joint resolution (No. 24) of Congress approved May 5, 1894 (28 Stat., 582), authorizes the Secretary of the Treasury to make partial payments on contracts for the construction of vessels of the Treasury Department, but not in excess of 75 per cent of the amount of the value of the work already done. The law also requires that the contracts thereafter made shall provide for a lien upon such vessels for all advances so made.

The provisions of the joint resolution referred to are applicable to such of the bureaus of this department as were transferred to the Department of Commerce and Labor on July 1, 1903, by act of February 14, 1903 (32 Stat., 825, secs. 4 and 10), creating the Depart-

ment of Commerce and Labor. In considering the provisions of this joint resolution the Supreme Court held (218 U. S., 473) that it does not create a statutory lien. The Comptroller of the Treasury stated in this connection (17 Compt. Dec., 898) as follows:

The Supreme Court recognized that there might be a distinction between a contract where the expressed intention of the contract was to make the Government's lien superior to that of contractors for labor and material and one in which such intention does not appear, but did not decide what would be the legal effect of a contract attempting to make the lien of the Government superior.

The legislation now proposed provides for a statutory lien, and the language contained therein, that such lien is made paramount to other liens, is similar to that appearing in act approved August 22, 1911 (37 Stat., 32), authorizing the Secretary of the Navy to make partial payments for work already done under public contracts, etc. It is desirable that similar legislation be enacted covering this department.

The department is also of opinion that legislation relative to partial payments should be uniform for the entire department. In the proposed draft the Secretary of Commerce may permit partial payments to be made, as provided for therein, in cases where it would be to the interest of the public service to do so.

Very truly, yours,

A. L. THURMAN,
Acting Secretary.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES,
Washington, D. C.

[Inclosure.]

A BILL Authorizing the Secretary of Commerce to make partial payments for work done under public contracts, and providing for a lien on account of all payments made.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of Commerce be, and he hereby is, authorized, in his discretion, to make partial payments from time to time during the progress of the work under contracts hereafter made under the Department of Commerce for public purposes, but not in excess of the value of work already done; and the contracts hereafter made shall provide for a lien in favor of the Government, which lien is hereby made paramount to all other liens, upon the articles or thing contracted for on account of all payments so made: *Provided,* That partial payments shall not be made under such contracts except where stipulated for, and then only in accordance with contract provisions.



HOLDER OF TITLE TO RAILROADS FROM ATCHISON TO
WATERVILLE, KANS.

L E T T E R

FROM

THE SECRETARY OF THE TREASURY,

TRANSMITTING

CERTAIN INFORMATION, UNDER DIRECTION OF HOUSE RESOLUTION NO. 295, REGARDING HOLDER OF TITLE TO RAILROADS FROM ATCHISON TO WATERVILLE, KANS., AND WHETHER THE UNITED STATES HAS COMMENCED ACTION TO RECOVER PRINCIPAL AND INTEREST DUE ON BONDS ISSUED BY THE UNITED STATES TO THE RAILROAD COMPANY.

JULY 15, 1914.—Referred to the Committee on Ways and Means and ordered to be printed.

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, July 14, 1914.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to acknowledge the receipt of House resolution No. 295, of July 7, 1914, directing the Secretary of the Treasury, if not incompatible with the public interest, to send to the House of Representatives certain information now contained in the files of the Treasury Department, as follows:

Resolved, That the Secretary of the Treasury be directed, if not incompatible with the public interest, to send to the House of Representatives the following information, so far as this information is now contained in the files of the Treasury Department:

First. What corporation now holds title to the one hundred miles of railroad extending from Atchison to Waterville, Kansas, formerly owned by the Central Branch of the Union Pacific?

Second. Did the United States issue bonds to this railroad company to the amount of \$1,600,000?

Third. If so, has the principal and interest been paid? If not, state the amount still due.

Fourth. Has the United States made demands upon the present owners of the said railroad for reports of its business?

Fifth. Has the United States commenced action to recover the amount of principal and interest due from said railroad? If so, state action taken by your department.

In response to the resolution, and as compliance with the request is not incompatible with the public interest, I have the honor, by direction of the President, to inform you:

First. It appears that the title to the 100 miles of railroad extending from Atchison to Waterville, Kans., formerly owned by the Central Branch Union Pacific Railroad Co., is now held by the Missouri Pacific Railway.

Second. Bonds to the amount of \$1,600,000 were issued by the United States in aid of the construction of said 100 miles of railroad, as authorized by the act of July 1, 1862 (12 Stat., 489).

Third. The United States paid the principal of said bonds at maturity and the interest thereon as it became due, and on account of the principal and interest, less transportation earnings credited on the interest, the Central Branch, Union Pacific Railroad Co., is indebted to the United States, as shown in the public debt statement for June 30, 1914, in the sum of \$3,621,059.99, as follows:

Principal.....	\$1, 600, 000. 00
Interest.....	2, 021, 059. 99
	3, 621, 059. 99

Fourth. It appears from the accompanying copies of correspondence that, though requested so to do, the present owners of the railroad have not made any reports of its business subsequent to the close of the fiscal year ended June 30, 1903.

Fifth. The United States has not commenced action to recover the amount of the principal and interest due on account of the bonds issued in aid of the construction of the Central Branch, Union Pacific Railroad.

It seems, however, that the Secretary of the Treasury in October, 1910, requested the Solicitor of the Treasury to examine into and report to him the condition of said indebtedness, with a view to taking such steps as might be found advisable for the recovery of the debt due the United States.

By direction of President Taft the report of the solicitor was reviewed by Attorney General Wickersham, and in his opinion of January 27, 1913, he differed with the solicitor. In a further report of March 29, 1913, the solicitor adhered to his views as contained in his report of July 27, 1911.

As all the facts of the case are set out in the opinion of Attorney General Wickersham and in the reports of the Solicitor of the Treasury referred to herein, copies are transmitted herewith marked "A," "B," and "C."

Copies are also transmitted of correspondence relating to the subject, marked "D" to "Y," inclusive.

For your further information I have the honor to advise you that the Solicitor of the Treasury has been requested to prepare the case for submission to the present Attorney General for reconsideration of the opinion of his predecessor.

Respectfully,

W. G. McADOO, *Secretary.*

A.

CENTRAL BRANCH UNION PACIFIC RAILROAD.

With respect to the status of the claim of the United States against the old Central Branch Union Pacific Railroad, now constituting a part of the Missouri Pacific system, on account of the subsidy bonds issued by the Government in aid of the construction of said road, *held*:

- (1) That the property of the company is not now subject to a first lien in favor of the Government to secure the payment of the amounts paid by the United States, since the act of July 2, 1864, expressly subordinated the lien of the United States to the lien of the first-mortgage bonds;
- (2) That the Government has no right to demand the annual payment of 5 per cent of the net earnings of the company, because the right to the 5 per cent of the net earnings was intended as a security and sinking fund for the Government's loan, and, therefore, its existence depends upon the existence of the debt;
- (3) That the Government has no right to withhold the entire compensation earned by the company for transportation services;
- (4) That the Government still has the right to retain one-half of this compensation;
- (5) That the Government still has the right of a junior mortgagee to redeem.

DEPARTMENT OF JUSTICE,
January 27, 1913.

SIR: Last March you referred to me a letter from the Secretary of Treasury, which laid before you the results of an investigation, in a report made to him by the Solicitor of the Treasury, on the present status of the claim of the United States against the Central Branch Union Pacific Railroad on account of subsidy bonds. This report recommended certain action to be taken, based upon the assumption that the Government still retains a first lien upon so much of the Missouri Pacific Railroad as is embraced in the old Central Branch Union Pacific Railroad being the 100 miles of road extending from Atchison to Waterville, Kans., on account of the subsidy loan in the form of bonds issued and paid by the Government to aid in the construction of said road.

I have had this opinion and the questions involved in it very carefully studied in this department, with the result that we are unable to agree with the conclusions of the Solicitor of the Treasury.

Briefly speaking, the facts in the case are these:

The act of July 1, 1862 (12 Stat., 489), "An act to aid in the construction of a railroad and telegraph line from the Missouri River to the Pacific Ocean, and to secure to the Government the use of the same for postal, military, and other purposes," the enabling act, so to speak, for the Pacific railroads, in section 13 authorized the Hannibal & St. Joseph Railroad Co., of St. Joseph, to extend its railroad from St. Joseph via Atchison for 100 miles westward into Kansas, and to use for this purpose any charter that may, or may have been, granted by the Legislature of Kansas.

In 1863 this company assigned all of its rights under the act of 1862 to the Atchison & Pikes Peak Railroad Co., a corporation of the State of Kansas, the name of which was changed to Central Branch of the Union Pacific Railroad Co. by an act of July 1, 1867, passed by the Legislature of Kansas. Under this assignment from the Hannibal & St. Joseph Railroad Co. the Atchison & Pikes Peak Railroad Co., at first under its original name and later under its new name and in accordance with the terms and conditions of the act of 1862 and its subsequent amendments, constructed 100 miles of

railroad and telegraph lines as authorized from Atchison to Waterville, Kans. In the course of this construction the company received from the Government, as provided in the above acts, \$1,600,000 face value, 30-year 6 per cent subsidy bonds. These bonds were delivered in five installments upon the completion of successive 20-mile sections of railroad, as follows:

\$320,000 face value on July 27, 1866.
 \$320,000 face value on December 7, 1866.
 \$320,000 face value on May 2, 1867.
 \$320,000 face value on December 4, 1867.
 \$320,000 face value on January 21, 1868.

Prior to the issue of these bonds and on May 1, 1865, and in advance of construction, the company issued \$1,600,000 face value of its own 30-year 6 per cent bonds secured by a first mortgage upon the whole of said 100 miles of railroad, telegraph lines, and properties under the authority granted by Congress in the acts of July 2, 1864 (13 Stat., 356, sec. 10), and of March 3, 1865 (13 Stat., 504), amending the act of 1862.

Default was made in the payment of principal and interest on these bonds in May, 1895, and shortly thereafter a suit to foreclose was instituted in the United States Circuit Court for the District of Kansas by Samuel Carr, the surviving trustee under the mortgage or trust deed given to secure the company's bonds.

The sum of \$2,786,188.70 was found due the bondholders for principal and interest, and on February 14, 1898, a final decree was entered directing the sale of all the properties. A sale for \$2,350,000 resulted, which was confirmed by the court June 27, 1898, and shortly thereafter a deed conveying the whole property was made to the purchasers. The property was subsequently turned over to a newly organized Kansas corporation for which the purchase had been made, and now constitutes a part of the Missouri Pacific system.

The question now raised in the memorandum report of the Solicitor of the Treasury relate to the effect of the company's issue of its own bonds and the execution and foreclosure of the mortgage given to secure them upon the lien and security given to the Government in the act of 1862 and its subsequent amendments.

The act of 1862 (12 Stat., 489) provided that the word "company" whenever used should be taken to include its "associates, successors, or assigns." The provisions relating specifically to the subsidy bonds are as follows:

SEC. 5. *And be it further enacted*, That for the purposes herein mentioned the Secretary of the Treasury shall, upon the certificate in writing of said commissioners of the completion and equipment of forty consecutive miles of said railroad and telegraph, in accordance with the provisions of this act, issue to said company bonds of the United States of one thousand dollars each, payable in thirty years after date, bearing six per centum per annum interest (said interest payable semiannually) which interest may be paid in United States Treasury notes or any other money or currency which the United States have or shall declare lawful money and a legal tender, to the amount of sixteen of said bonds per mile for such section of forty miles; and to secure the repayment to the United States, as hereinafter provided, of the amount of said bonds so issued and delivered to said company, together with all interest thereon which shall have been paid by the United States, the issue of said bonds and delivery to the company shall ipso facto constitute a first mortgage on the whole line of the railroad and telegraph, together with the rolling stock, fixtures, and property of every kind and description, and in consideration of which said bonds may be issued; and on the refusal or failure of said company to redeem said bonds, or any part of them, when required so to do by the Secretary of the Treasury, in accordance with the provisions

of this act, the said road, with all the rights, functions, immunities, and appurtenances thereunto belonging, and also all lands granted to the said company by the United States, which, at the time of said default, shall remain in the ownership of the said company, may be taken possession of by the Secretary of the Treasury, for the use and benefit of the United States: *Provided*, This section shall not apply to that part of any road now constructed.

SEC. 6. *And be it further enacted*, That the grants aforesaid are made upon condition that said company shall pay said bonds at maturity, and shall keep said railroad and telegraph line in repair and use, and shall at all times transmit dispatches over said telegraph line, and transport mails, troops, and munitions of war, supplies, and public stores upon said railroad for the Government, whenever required to do so by any department thereof, and that the Government shall at all times have the preference in the use of the same for all the purposes aforesaid (at fair and reasonable rates of compensation, not to exceed the amounts paid by private parties for the same kind of service); and all compensation for services rendered for the Government shall be applied to the payment of said bonds and interest until the whole amount is fully paid. Said company may also pay the United States, wholly or in part, in the same or other bonds, Treasury notes, or other evidences of debt against the United States, to be allowed at par; and after said road is completed, until said bonds and interest are paid, at least five per centum of the net earnings of said road shall also be annually applied to the payment thereof.

These particular provisions were amended by the act of 1864 (13 Stat., 356), as follows:

SEC. 5. *And be it further enacted*, That the time for designating the general route of said railroad, and of filing the map of the same, and the time for the completion of that part of the railroads required by the terms of said act of each company, be, and the same is hereby, extended one year from the time in said act designated; and that the Central Pacific Railroad Company of California shall be required to complete twenty-five miles of their said road in each year thereafter, and the whole to the State line within four years, and that only one-half of the compensation for services rendered for the Government by said companies shall be required to be applied to the payment of the bonds issued by the Government in aid of the construction of said roads.

SEC. 10. *And be it further enacted*, That section five of said act be so modified and amended that the Union Pacific Railroad Company, the Central Pacific Railroad Company, and any other company authorized to participate in the construction of said road, may, on the completion of each section of said road, as provided in this act and the act to which this act is an amendment, issue their first mortgage bonds on their respective railroad and telegraph lines to an amount not exceeding the amount of the bonds of the United States, and of even tenor and date, time of maturity, rate and character of interest with the bonds authorized to be issued to said railroad companies respectively. And the lien of the United States bonds shall be subordinate to that of the bonds of any or either of said companies hereby authorized to be issued on their respective roads, property, and equipments, except as to the provisions of the sixth section of the act to which this act is an amendment, relating to the transmission of despatches and the transportation of mails, troops, munitions of war, supplies, and public stores for the Government of the United States. And said section is further amended by striking out the word "forty," and inserting in lieu thereof the words "on each and every section of not less than twenty."

The act of 1865 (13 Stat., 504) in turn provided that the company's own bonds might be issued in advance of construction.

The act of March 3, 1871 (16 Stat., 525), amended the act of 1862 by directing the Secretary of the Treasury to pay over in money to the railroad companies mentioned therein and performing services to the United States one-half of the compensation provided by law for such services theretofore or thereafter rendered. But the act of March 3, 1873 (17 Stat., 508), now sections 5260-5261, Revised Statutes, directed the Secretary of the Treasury to withhold all payments to any railroad company and its assigns on account of freights or transportation over their respective roads, of any kind, to the amount of payments made by the United States for interest upon bonds of the United States issued to any such company, and

which shall not have been reimbursed, together with 5 per cent of the net earnings due and unapplied as provided by law; and provided that any such company might bring suit in the Court of Claims to recover the price of such freight and transportation as might appear from the law and the facts to be due to the company.

Sections 5 and 6 of 1862 the act of 1862 as amended by sections 5 and 10 of the act of 1864 show plainly that the Government was given a threefold security in addition to the condition subsequent that the bonds should be paid at maturity:

(1) A preferential right to transportation, including the right to withhold one-half of the compensation due for such services.

(2) A right upon completion of the road to an annual payment of 5 per cent of the net earnings.

(3) A mortgage upon the whole property of the road.

Section 10 of the act of 1864, however, subordinated the Government's lien and security, except for certain provisions relative to the Government's right to transportation contained in section 6 of the act of 1862.

Relative to this whole transaction, the Supreme Court has held that none of these acts imposed upon the company an obligation to pay either principal or interest until maturity, and on this ground it was held that in a suit brought by the company under the act of 1873 for one-half of the compensation due for services rendered the Government, the Government had no right to set off unpaid interest against this claim since there was no obligation upon the company to pay current interest. (*United States against Union Pacific Railroad Co.*, 91 U. S., 72.)

The same court has held that when the Government subordinated this lien by the act of 1864, it also subordinated its whole debt, and on this ground decided that the holders of the company's first mortgage bonds, to which it had given priority over its own debt and security, were entitled to payment of interest out of net earnings in priority to the payment of 5 per cent net earnings due the Government. (*Union Pacific Railroad Co. against United States*, 99 U. S., 402.)

The effect of the act of 1864, therefore, was to displace and subordinate the Government's position as creditor except to the extent that the Government's priority was expressly reserved.

The Solicitor of the Treasury contends, nevertheless, that these obligations of the mortgagor company ran with the land into the hands even of bona fide purchasers at the foreclosure sale under the mortgage issued to secure the company's own bonds, pursuant to the act of 1864. He, therefore, maintains that the Government is entitled (1) to withhold all compensation earned by the company by transportation services rendered the Government; (2) to demand the annual payment of 5 per cent out of the net earnings; (3) to demand payment of the whole debt, principal and interest; and (4) to redeem the property.

I differ with the solicitor, and upon the facts stated I am of the opinion—

1. That the property is not now subject to a first lien in favor of the Government to secure the payment of the amounts paid by the United States. The act of July 2, 1864, above cited, expressly subordinated the lieu of the United States to the lien of the "new first mortgage bonds" to be issued.

The present holders take their title under the foreclosure of the mortgage made to secure those very "new first mortgage bonds." This was squarely decided in the case of *Union Pacific Co. v. United States* (99 U. S., 402-427).

2. The Government has no right to demand the annual payment of 5 per cent of the net earnings.

This follows from proposition 1, because the right to the 5 per cent of the net earnings was intended as a security and sinking fund for the Government's loan, and, therefore, its existence depends upon the existence of the debt. (*Union Pacific Co. v. United States*, 99 supra.)

3. The Government has no right to withhold the entire compensation earned by the company for transportation services.

The authority adduced to support this claim is the act of March 3, 1873 (secs. 5260 and 5261, Revised Statutes), which, however, is obviously a provision for a set-off against a debt, and it was so squarely held in the first of the *Union Pacific* cases on this general subject. (*United States v. Union Pacific*, 91 U. S., 72.)

4. The Government still has the right to retain one-half of this compensation.

This proposition was decided by Attorney General Griggs (22 Op., 396) and has always been accepted without controversy.

5. Also it appears that the United States still has the right of a junior mortgagee to redeem.

Whether or not the United States could have been brought by process into the foreclosure proceedings (which occurred in 1898) may be doubtful. The consent to be sued might, perhaps, be found in the Tucker Act (24 Stat., 505), section 1, subsection 1, especially in connection with section 4 of the act of March 3, 1887 (24 Stat., 491), which directs the Attorney General to "defend the rights and interests of the United States in respect of the matters in this section mentioned (redemption of paramount liens, etc.), and to take steps to foreclose any mortgages or liens of the United States on any such railroad property." (Act of Mar. 3, 1887, sec. 4, 24 Stat., 491.)

It is doubtful whether, irrespective of these provisions, the United States could compulsorily have been made a defendant. (*Jones on Railroad Securities*, 3d ed., par. 400; *Hill v. U. S.*, 9 How., 385; *United States v. McLemore*, 4 How., 286; *Elliot v. Van Voorst*, 3 Wall. Jun., 299; *Fifth National Bank v. Long*, 7 Biss., 502; *Meier v. Kans. Pac. Ry.*, 4 Dill, 378.)

But this is really immaterial, because even if it could have been made a party it was not in fact made a party, and, therefore, it has the usual right of a junior mortgagee who has not been a party to the foreclosure of a prior lien, which is a right to redeem under conditions. (*Noyes v. Hall*, 97 U. S., 34; *Gordon v. Hobart*, 10 Fed. Cas., No. 5609; *Gage v. Brewster*, 31 N. Y., 218; *Jones on Railroad Securities*, 3d ed., 441; *Barrett v. Blackmar*, 47 Iowa, 565, 571; *Douglass v. Bishop*, 27 Iowa, 214, 216; 27 Cyc. 1578, collecting a large number of cases.)

Attorney General Griggs did consider the advisability of redeeming this very property, but felt that at that time its value was not sufficient to provide an adequate equity (22 Op., 398).

The figures as given by the report of the Solicitor of the Treasury (pp. 52, 54) would seem to indicate a fairly substantial equity in the

property at its present valuation over and above the amounts which the Government would have to allow as preliminary to its right to redeem.

While the data is not sufficient to compute just what the equity would be, it would seem probable that there is a substantial balance which might be recovered either by actual resale or through a settlement. But that is a question for the Secretary of the Treasury to determine upon investigation of the facts which I have not before me. It is, therefore, sufficient for me to say that for the reasons which I have briefly expressed, I am unable to concur with the recommendations of the Solicitor of the Treasury.

Respectfully,

GEORGE W. WICKERSHAM.

The PRESIDENT.

B.

DEPARTMENT OF JUSTICE,
OFFICE OF THE SOLICITOR OF THE TREASURY,
Washington, D. C., July 28, 1911.

HON. FRANKLIN MACVEAGH,
Secretary of the Treasury.

MY DEAR SIR: I am transmitting you herewith my report on the present status of the claim of the United States on account of the subsidy bonds issued and paid by the United States as aid in the construction of the Central Branch Union Pacific Railroad Co.

Yours, very respectfully,

W. T. THOMPSON, *Solicitor.*

REPORT OF W. T. THOMPSON, SOLICITOR OF THE TREASURY, TO
HON. FRANKLIN MACVEAGH, SECRETARY OF THE TREASURY, ON
THE PRESENT STATUS OF THE CLAIM OF THE UNITED STATES AGAINST
THE CENTRAL BRANCH UNION PACIFIC RAILROAD ON ACCOUNT OF
SUBSIDY BONDS.

[July 27, 1911.]

DEPARTMENT OF JUSTICE,
OFFICE OF THE SOLICITOR OF THE TREASURY,
Washington, July 27, 1911.

HON. FRANKLIN MACVEAGH,
Secretary of the Treasury.

SIR: I have the honor to respond to your request of me to investigate the condition of the claim of the United States for \$1,600,000 and accrued interest against the Central Branch Union Pacific Railroad Co., or, perhaps more correctly speaking, the 100 miles of railroad extending from Atchison to Waterville, Kans., on account of a subsidy loan, in the form of bonds issued and paid by the Government to aid in the construction of said road, and to report to you as to the advisability of taking action looking to the recovery of this claim.

I beg leave to advise you that after much correspondence touching the matter, a thorough examination of the various statutes bearing on the subject, and the opinions of the different Attorneys General,

the Supreme Court, and Comptroller of the Treasury it seems quite probable that much of the principal, if not all of it, together with a large amount of interest, will be ultimately lost to the Government if no more aggressive action is taken in the future looking to its collection than seems to have been taken in the past.

To acquaint you with the present status of the claim, your attention is directed (1) to the legislation of Congress creating or affecting the claim, (2) to the facts in relation thereto, and (3) the various rulings of the Supreme Court, the Attorneys General, and the Comptroller of the Treasury on questions that have arisen from time to time on the facts and the law in relation to this particular claim or to other claims of a kindred character growing out of the same legislation from which this claim had its origin.

LEGISLATION.

An act of Congress approved July 1, 1862 (12 Stat., 489), created Walter S. Burgess and 163 others, including 5 commissioners to be named by the Secretary of the Interior, and all persons associated with them, and their successors, as a body corporate and politic by the name and style of "The Union Pacific Railroad Co."

The company thus chartered was authorized to locate, construct, furnish, maintain, and enjoy a continuous railroad and telegraph, with the appurtenances, from a point on the one hundredth meridian of longitude west from Greenwich, between the south margin of the valley of the Republican River and the north margin of the valley of the Platte River, in the Territory of Nebraska, to the western boundary of Nevada Territory.

To aid in the construction of this road and telegraph line, the act granted to the company every alternate section of public land, designated by odd numbers, to the amount of five alternate sections per mile on each side of said road within the limit of 10 miles on each side.

Upon the completion and equipment of 40 consecutive miles of road and telegraph the Secretary of the Treasury was directed to issue to the company bonds of the United States of \$1,000 each, to the amount of 16 of said bonds for each mile of road, the bonds to be payable in 30 years, bearing interest at the rate of 6 per cent per annum, payable semiannually. The United States was to have a first mortgage lien upon the whole of the railroad and telegraph, rolling stock, fixtures, and property of every kind to secure the payment of said bonds.

The grants aforesaid were made upon the expressed conditions that the company should pay the bonds at maturity and keep the railroad and telegraph line in repair and use and at all times transmit dispatches over the telegraph line and transport mails, troops, and munitions of war, supplies, and public stores upon such railroad for the Government, and the Government to have the preferential right to the use of the road for these purposes at a rate of compensation not to exceed the amount paid by private parties for such services, and that all compensation for such services rendered to the Government and, after said road should be completed, at least 5 per cent of the net earnings of said road, should be applied to the payment of said bonds and the interest thereon until the same were fully paid.

The act also authorized certain other railroad companies to build, construct, and equip other lines of railroad and telegraph upon the

same terms and conditions, securing to themselves the same grants and subsidy loans as those imposed and conferred upon the Union Pacific Railroad Co., by filing assent to the provisions of said act. Among the companies so authorized was the Hannibal & St. Joseph Railroad from St. Joe by way of Atchison westward 100 miles into Kansas, upon filing its assent to the provisions of said act, upon the same terms and conditions, and entitled to the same benefits in all respects as were provided in the act for the construction of a railroad and telegraph line by the Union Pacific Railroad Co., and for that purpose was authorized to use any railroad charter which had been or might be granted by the Kansas Legislature. The 100 miles mentioned constitutes the 100 miles involved in the claim in question, and extends from Atchison to Waterville, Kans.

The act further expressly provided that wherever the word "company" is used in said act, it is to be construed to embrace the words "their associates, successors, and assigns," the same as if the words had been properly added thereto.

It provided also that the corporation thereby created and the roads connected therewith should make to the Secretary of the Treasury annual reports, duly verified by the president of the company, disclosing (1) the names of the stockholders and their places of residence, (2) the names and residences of the directors and other officers of the corporation, (3) the amount of stock subscribed and the amount actually paid in, (4) a description of the lines of road surveyed, of the lines thereof fixed upon for the construction of the road and cost of survey, (5) the amount received from passengers on the road, (6) the amount received from freight thereon, (7) the expenses of said road and its fixtures, and (8) a statement of the indebtedness of said company, setting forth the various kinds thereof.

The original act of 1862 was amended by a subsequent act of Congress in some particulars. Only such will be here mentioned as seem relevant and material to the status of the claim involved. The act of July 2, 1864 (13 Stat., 356), so amended section 5 of the original act as to authorize any company or companies participating in the construction of any of the roads and telegraph lines provided for, on the completion of each section of 20 miles, to issue first-mortgage bonds on their respective roads and telegraph lines to an amount not exceeding the amount of the bonds of the United States, of even tenor and date, time or maturity, and rate and character of interest with the subsidy bonds, and making the lien of the United States bond subordinate to the bonds of any or either of said companies thereby authorized to be issued on their roads, property, and equipment—

except as to the provisions of the sixth section of the act to which this act is an amendment relating to the transmission of dispatches and the transportation of mails, troops, munitions of war, supplies, and public stores for the Government of the United States.

This act further authorized the Government to apply only one-half of the transportation charges to the payment of the subsidy bonds.

An act approved March 3, 1865 (13 Stat., 504), so amended the act of 1864 as to authorize the railroad companies mentioned to issue their 30-year 6 per cent bonds to the extent of 100 miles in advance of a continuous completed line of construction.

An act approved June 25, 1868 (15 Stat., 79), so amended the act of 1862 as to require the annual reports of bond-aided railroad companies to be made to the Secretary of the Interior, instead of to the Secretary of the Treasury.

By an act approved March 3, 1871 (16 Stat., 525), the act of 1862 was so amended as to direct the Secretary of the Treasury to pay over in money to the railroad companies mentioned therein and performing services to the United States, one-half of the compensation provided by law for such services heretofore or thereafter rendered.

By an act approved June 19, 1878 (20 Stat., 169), the acts of 1862 and 1868 were again amended, and the office of auditor of railroad accounts was created, and to this officer the railroad companies were required to make reports. The duties of the auditor under and subject to the direction of the Secretary of the Interior were to furnish a system of reports to be rendered to him by such railroad companies, whose roads were in whole or in part west, north, or south of the Missouri River; to examine the books and accounts of such companies once in each fiscal year, and at such other times as deemed by him necessary to determine the correctness of any report received from them; to assist the Government directors in the performance of their duties; to see that the laws relating to such companies were enforced, to furnish such information to the several departments of the Government as might be by them required, or in the absence of any request therefor as he might deem expedient for the Government's interests, and to make an annual report to the Secretary of the Interior on the 1st day of November on the condition of each railroad company, its road, accounts, and affairs for the fiscal year ending June 30 immediately preceding.

This act further imposed a penalty of not less than \$1,000, and not more than \$5,000 upon any such company for a failure, neglect, or refusal to make such reports as might be called for, or to submit its books and records for inspection. The said penalty to be recovered in an action therefor by the Attorney General.

It further provided that it was the duty of the Secretary of the Interior to inform the Attorney General of any neglect or refusal before mentioned.

This act further expressly declared that the same should apply to any and all persons or corporations into whose hands either of such railroads might lawfully come, as well as the original companies.

By the act approved March 3, 1881, the name "Auditor of Railway Accounts" was changed to "Commissioner of Railroads." (21 Stat., 409.) This office was continued until the 20th of June, 1904, when, by the act approved March 3, 1903, it was terminated and the duties of commissioner were transferred to the Secretary of the Interior, together with the records and files of the office. (32 Stat., 1119.)

By the act approved March 3, 1873, now sections 5260 and 5261, Revised Statutes, the Secretary of the Treasury is directed to withhold all payments to any railroad company and its assigns, on account of freights or transportation, over their respective roads, of any kind, to the amount of the payments made by the United States for interest upon bonds of the United States issued to any such company, and which shall not have been reimbursed together with 5 per cent of net earnings due and unapplied as provided by law; and

any such company may bring suit in the Court of Claims to recover the price of such freight and transportation. (17 Stat., 508.)

By the act approved June 22, 1874, the Secretary of the Treasury is directed to require payment of the railroad companies, their successors and assigns, all sums of money due, or to become due, the United States for the 5 per cent of the net earnings provided for in the act approved July 1, 1862, relating to the Pacific Railroad, and in case either of such railroad companies shall neglect to pay the same within 60 days after demand therefor made upon the treasurer of such railroad company, the Secretary of the Treasury is directed to notify the Attorney General, who shall thereupon institute the necessary suits and proceedings to collect the same in the proper courts of the United States. (18 Stat., 200.)

By the act of March 3, 1887, it was provided that whenever, in the opinion of the President, it may be deemed necessary to the protection of the interests and the preservation of the security of the United States in respect to its lien, mortgages, or other interest in any of the property of the several companies upon which a lien, mortgage, or other incumbrance paramount to the right, title, or interest of the United States for the same property, or any part of the same, may exist and be then lawfully liable to be enforced, the Secretary shall, under the direction of the President, redeem or otherwise clear off such paramount lien, mortgage, or other incumbrance by paying the sums lawfully due in respect thereof out of the Treasury, the United States thereupon becoming subrogated to all rights and securities pertaining to the debt, mortgage, lien, or other incumbrance in respect of which such payment shall have been made. It also makes it the duty of the Attorney General, under the direction of the President, to take all such steps and proceedings in the courts or otherwise as are necessary to redeem such lien, mortgage, or other incumbrance, and protect the rights and interests of the United States in respect of the said matters, and to take steps to foreclose such mortgages or liens of the United States on said property. (24 Stats., 488.)

THE FACTS.

'The facts, as I have been able to ascertain them, are substantially as follows:

The Hannibal & St. Joseph Railroad Co., which, under the act of 1862, was authorized to extend its road from St. Joseph, Mo., by way of Atchison westwardly through Kansas, assigned all of its rights under the act of 1863, so far as related to the 100 miles of road in question, to the Atchison & Pikes Peak Railroad Co., which had acquired a charter from the Kansas Legislature. By subsequent act of the legislature of Kansas, passed July 1, 1867, the name of the company was changed to that of the Central Branch Union Pacific Railroad Co.

By virtue of the acts of Congress approved July 2, 1864, and March 3, 1865, the Atchison & Pikes Peak Railroad Co. executed and delivered, on the 1st day of May, 1865, its first mortgage or trust deed on the said 100 miles of its proposed road and telegraph line to John E. Williams and Benjamin W. Bonney, trustees, for the purpose of securing the payment of its bonds in the sum of \$1,600,000. The bonds thus issued and secured were 1,600 in number for \$1,000 each, bearing interest at the rate of 6 per cent per annum, payable

semiannually in gold coin, on the 1st days of November and May of each year, the principal becoming due and payable on the 1st day of May, 1895.

The \$1,600,000 of the United States subsidy bonds were delivered to the company as each section of 20 miles of road and telegraph line was completed, as follows:

\$320,000 on July 27, 1866.
 \$320,000 on December 7, 1866.
 \$320,000 on May 2, 1867.
 \$320,000 on December 4, 1867.
 \$320,000 on January 21, 1868.

These bonds matured 30 years after date, and were dated when issued.

Default in payment by the company was made on the five several block sums of \$320,000 each and interest, respectively, on July 27, 1896; December 7, 1896; May 2, 1897; December 4, 1897; and January 21, 1898.

These bonds bore interest at the rate of 6 per cent per annum payable semiannually, on the 1st day of July and January of each year. The interest and principal were paid from time to time by the United States as they matured. The principal and simple interest thereon for 30 years, paid by the Government, amounted to \$3,880,000. If to this sum there be added 6 per cent simple interest on the principal sums since paid, we have nearly \$5,250,000 due the Government, less the amount paid or credited thereon on account of 5 per cent of the net earning received and one-half transportation charges.

There have been credited the company on account of one-half transportation charges for carrying Government property, mail, etc., \$796,833.68. Adding to this amount the sum of \$6,926.91 credited on account of 5 per cent net earnings, makes the total credit given the road on its indebtedness to the Government \$803,760.59. Deducting this amount from the interest and principal now due the United States on account of its subsidy bonds, leaves approximately \$4,500,000 still unpaid. In addition to the subsidy loan made in aid of construction of this 100 miles, the company received patents to 223,080.50 acres of land.

It is proper to note in this connection that the above sum of \$6,926.91 credited on account of 5 per cent of net earnings was not a voluntary payment by the railroad company, but was a sum claimed as a set-off and allowed by the Court of Claims in an action brought in that court by the Central Branch Union Pacific Railroad Co. to recover the sum of \$25,521.04 alleged to be due it for carrying the mails. The amount of this set-off was alleged to represent 5 per cent of the net earnings from the beginning of its operations down to December 31, 1878. From the last-mentioned date down to the present time no other amount has been credited the company or paid by it on account of the net earnings, although it appears from reports filed with the auditor of railroad accounts and the commissioner of railroads that this road had for nearly every year substantial net earnings.

The line of railroad and telegraph in question was operated from December 31, 1885, by the Missouri Pacific Railway Co. under a 25-year lease, by the terms of which the net earnings were made

payable as rental to the Union Pacific Railway Co., which owned \$874,200 of the \$1,000,000 capital stock. Default was made in the payment of the principal and interest on the bonds secured by the trust deed May, 1895. Shortly thereafter a suit in equity was instituted in the Circuit Court of the United States for the district of Kansas by Samuel Carr, surviving trustee, to foreclose said trust deed. In this suit the Government was made a party defendant, but no process was attempted to be served upon it and no appearance was made for it. On the 14th of February, 1898, a decree was entered in said proceeding. In the decree it was found that there was due upon the bonds secured by the trust deed, inclusive of interest, the sum of \$2,786,188.70, and that the lien created thereby was paramount to all other liens on said railroad and telegraph property, together with the net proceeds and income derived, or which might be derived from said property since the commencement of the foreclosure suit. This railroad and telegraph line and the property belonging thereto were bought at foreclosure sale on May 23, 1898, by Simon Borg and Gilmer Clapp, for \$2,350,000, and thereafter said sale was in all things confirmed.

After this foreclosure there was organized, in June, 1898, under the laws of Kansas a corporation by the name of the Central Branch Union Pacific Railway Co. To this company Simon Borg and Gilbert Clapp conveyed all the railroad property and telegraph line purchased by them at the foreclosure sale. On June 30, 1898, the entire capital stock of the new company was purchased by the Missouri Pacific Railway Co., and the 100 miles of railroad and telegraph line under consideration passed under the control of the last mentioned company.

The Central Branch Union Pacific Railway Co. on July 8, 1899, by articles of agreement and consolidation between it and the Atchison & Pacific Railway Co. and the Atchison, Jewell County & Western Railway Co., became a part of the Central Branch Railway Co., another corporation organized under the laws of the State of Kansas. The last-named company by contract and articles of consolidation, dated May 29, 1909, became a part of the Missouri Pacific Railway Co., organized under the laws of the States of Missouri, Kansas, and Nebraska.

No effort appears to have been made since the foreclosure mentioned to collect any part of the 5 per cent net earnings from the operations of this road. No reports appear to have been made to the Secretary of the Interior by the company showing the gross or net earnings of this road since 1903. Nor does it appear that any demand by that officer has been made upon that company for such reports. I am advised through the chief counsel of the Missouri Pacific Railway Co. that at present, and for some years past no segregated account of the fiscal operations of this 100 miles of road has been kept showing its net earnings, if it had any. For these reasons it has been impossible to ascertain with any degree of certainty how much, if anything, the Government may have lost had the 5 per cent of said earnings been paid upon this claim. Through the Kansas Public Utilities Commission I am advised that the net operating revenue of the Central Branch Railway Co., operating 388.19 miles

of railroad, of which this particular 100 miles is a part, for the years 1902, 1904, 1906, 1907, 1908, and 1909 amounted in the aggregate to \$3,454,700.33.

I am informed by the Kansas Railway Commission that the present assessed valuation of this road is \$35,000 per mile, or \$3,500,000 in all. It extends into and traverses one of the best agricultural sections of the State of Kansas.

It appears from Government records consulted that of the 781,944.83 acres of lands granted in aid of the construction of this road, 218,250.08 were patented to the Central Branch Union Pacific Railroad Co. or its assigns, prior to the default made in the payment of the subsidy bonds, and that patents to 4,830.42 acres have been issued since the date of such default.

THE DECISIONS.

One of the first decisions construing the statutes relative to the Pacific railroads was rendered in October, 1875, by the Supreme Court of the United States in the case of *The United States v. The Union Pacific Railroad Co.* (91 U. S., 72). It had its origin in a suit brought by the Union Pacific Railroad Co. against the United States in the Court of Claims to recover one-half of its charges for transporting mails, troops, supplies, and public stores for the Government. The railroad company conceded the right of the Government to presently retain the other half of its charges and apply them on account of the subsidy loan. The United States, on the other hand, insisted upon its present right to withhold all payments due for transportation by reason of the act of March 3, 1873, and the general right of set-off which it claimed to have for interest paid by it on the bonds as such interest matured in excess of sums credited to the company on account of one-half transportation charges for services rendered by it. The Court of Claims sustained the contention of the company and awarded judgment for one-half transportation charges then earned. The United States appealed the case to the Supreme Court, where the judgment of the Court of Claims was affirmed.

The court in substance held (1) that the act of March 3, 1873, did not repeal the provisions of the acts of 1862 and 1864 relative to the obligation of the company to pay the principal and interest on the subsidy bonds at maturity, but directed the Secretary to retain all charges due the company for transportation and remand the company to the judicial tribunals for a determination of the question whether the bond-aided railroad companies had the right "under the law and the facts" to recover from the Government the other one-half of what the company had earned by transportation; (2) that under the "law and the facts" in that particular case at the particular time the company was entitled to recover one-half transportation charges, because the company was not obliged to pay the Government interest as it matured on the bonds which had been paid by the Government in the first instance, but was obliged only to pay the bonds with the interest at maturity of the bonds; that the company was not at that time debtor to the Government on any claim then due for interest paid on the bonds by it which could be used as a set-off against the claim of the company for the one-half transportation charges sued for.

On the question of the obligation of the Government to the company by reason of the subsidy loan the court, in its opinion (p. 79), said:

The bonds in question were issued in pursuance of a scheme to aid in the construction of a great national highway. In themselves they do not import any obligation on the part of the corporation to pay; and whether, when the United States have paid interest on them, a liability to refund it is imposed on the company depends wholly on the conditions on which the bonds were delivered to and received by it. These conditions are embodied in the legislation of Congress on the subject; and if, on a fair interpretation of it, the corporation is found to be now a debtor to the United States, the deduction for interest paid on the bonds can be lawfully made. But if the converse of this proposition is true, the Government can not rightfully withhold from the corporation one-half of its earnings.

Another opinion was rendered by the Supreme Court in the case of *The Union Pacific Railroad Company v. The United States*, October, 1878 (99 U. S., 402), involving, among other things, the question of the meaning of the term "net earnings," and the right of the Government under the law and the facts of the case to the 5 per cent thereof. Suit was brought in the Court of Claims by the company to recover compensation for services rendered the United States during a portion of the year 1874 and the whole of the year 1875. Against the claim of the company a counter claim was set up by the Government founded upon the 5 per cent of the net earnings of the company claimed to be due and unpaid and earned since the date of the completion of the road, November 6, 1869, under the provisions of the sixth section of the act of July 1, 1862 (12 Stat., 489), which provided that—

after said road is completed until the said bonds and interest are paid at least 5 per cent of the net earnings of said road shall also be annually applied to the payment thereof.

The questions decided by the court in this case material to the present inquiry were (1) the meaning of the term "net earnings," and (2) whether such "net earnings" should be paid and applied, first, to the payment of interest on the first-mortgage bonds or to the interest of the subsidy bonds. It was held (1) that "net earnings" within the meaning of the law were ascertained by deducting from the gross earnings all the ordinary expenses of organization and of operating the road and expenditures made bona fide in improvements and paid out of earnings and not by the issue of bonds or stock, but that interest paid on any of the bonded debt of the company should not be deducted; and (2) that the priority given to the mortgage bonds of the company authorized the payment of interest accruing on such bonds out of the net earnings of the road in preference to the 5 per cent thereof payable to the Government, which was demandable out of the excess in each year, and if the net earnings should not exist or should be exhausted by claims for interest on the first-mortgage bonds, which the Government gave priority to over its own claim, there would be nothing for the Government to demand on that account. The rulings in this case were reaffirmed in the case of *United States v. Central Pacific Railroad Company* (99 U. S., 449).

The foregoing are the only opinions of the courts which appear to bear in any material manner upon the legal status of the present claim.

Attention is now called to the diverse opinions of the several Attorneys General in relation to the subject.

The Secretary of the Treasury, John Sherman, submitted to the Attorney General, Charles Devens, the following question:

Shall all compensation due for transportation for the Quartermaster's Department over those portions of the Sioux City & Pacific and the Central Branch Union Pacific Railroads which were built by the aid of Government bonds be withheld, or shall only one-half of such compensation be withheld?

To this question the Attorney General, June 30, 1880, categorically answered as follows:

All, because derelict in payment of interest, citing section 5260, Revised Statutes. (16 Op. A. G., 517.)

In February, 1883, the Secretary of the Treasury submitted to the Attorney General the question whether sections 5260 and 5261 of the Revised Statutes mean that previous to any payment of the accounts mentioned in said sections, they must be sanctioned by judgments in the Court of Claims as often as they arise, or only that, previous to such payment, the rule in such matters must have been ascertained by such judgment. Answering this inquiry, February, 1883, the Department of Justice, through the Solicitor General, in substance held that what the courts could do in a case submitted to them under the provisions of these sections was to ascertain and pronounce the law arising upon the facts submitted to them for consideration; that when the law should once be ascertained and declared it would ordinarily become the rule for all such facts whenever they might arise, meaning by "the facts" facts of the same character—facts essentially the same; that whether in a new case the circumstances and facts are essentially the same as in one previously litigated and determined, it is for the Secretary to determine, and that if he finds that they are the same he will be authorized to execute or pay in accordance with the previous adjudication, but if he is not satisfied as to this he will be governed by the direction in the statute, refuse to pay, and require the matter to be determined by the courts. (17 Op. A. G., 512.)

In 1886 the Secretary of the Treasury requested of the Attorney General advice on the following question:

Whether in the settlement and adjustment of the accounts of that company (the Sioux City & Pacific Railroad Co.) for Government transportation over the subsidized portion of its road the accounting officers should direct that the full amount of the compensation so earned be withheld under section 5260, Revised Statutes, or whether only one-half thereof should be withheld under the act of July 2, 1864, and the remaining one-half directed to be paid to the company.

To this the Attorney General replied and advised in substance that the direction in section 5260, Revised Statutes, "to withhold all payments" was then, November 12, 1886, no longer applicable, that only one-half of the amount of compensation due the company for transportation should be withheld to be applied as required by the act of July 2, 1864, and that the remaining one-half should be paid over to the company.

On February 4, 1891, Attorney General Miller advised the Secretary of the Navy that all compensation to bond-aided railroads for transportation of enlisted men of the Navy should be withheld until the right of such railroads were adjusted by agreement in compliance

with the terms of the law or were judicially determined. (20 Op. A. G., 11.) It is not altogether clear whether the bond-aided railroads involved in the particular case then under consideration by the Attorney General included more than the Union Pacific and the Central Pacific roads, which were governed by the Thurman Act of 1878, or whether there was also involved such other bonded roads as were exclusively governed by the act of March 3, 1873, with respect to the compensation for carriage of Government property and troops. In Mr. Miller's opinion both the acts of 1873 and 1878 are referred to as grounds for the conclusion reached by him to the effect that no part of the transportation charges earned by the roads should be voluntarily paid over to the companies.

On December 21, 1894, Attorney General Olney advised the Secretary of the Treasury that no demand upon the bond-aided railroad companies was necessary to fix their liability to reimburse the United States for all sums paid by the latter on account of principal and interest of subsidy bonds. (21 Op. A. G., 104.)

Another opinion of the Attorney General was delivered to the Secretary of the Treasury March 25, 1895 (21 Op. A. G., 145), as to the application of transportation charges earned on account of services rendered to the Government, and 5 per cent of net earnings, but as the matter considered had reference to the Central Pacific Co., which was controlled by the provisions of the Thurman Act of 1878, it has little, if any, application to the status of the claim against the Central Branch Union Pacific, which, with respect to such transportation charges, is governed by the act of March 3, 1873, and its general right of set-off.

March 30, 1899, Attorney General Griggs, at the request of the Secretary of the Treasury, delivered an opinion upon the question whether the Treasury Department should recognize the validity of the foreclosure sale of the Central Branch Union Pacific Railroad and pay in money for transportation services to the Government over the road instead of applying such compensation, in whole or in part, upon the subsidy debt of the company to the United States.

On this question the Attorney General held that, (1) while the United States was named as a party defendant in the bill of complaint in the foreclosure suit, it was not served with process, nor did it appear or become a party to the suit, and hence was not barred by the decree entered therein nor by the sale of the property under the decree, but might, if it should elect to do so, redeem or cause a resale of the property on account of its subsidy loan; (2) that its obligations to the United States were to pay 5 per cent of its net earnings after the road should be completed, to transport for the Government the mails, troops, Government stores, etc., and have half the compensation charges therefor applied to the payment of the subsidy bonds until such bonds and interest paid by the United States thereon are fully paid; (3) that these duties and obligations, among others therein mentioned, are obligations which follow the property whether passing by voluntary or forced sale and that anyone purchasing the road takes it subject to these burdens, imposed by well-known public statutes.

As to the character of these duties and obligations, the opinion recites:

By comparing the language of these acts making provisions for the operation of the railroad and telegraph lines for the right of the Government to use them, at fair rates, obliging the companies to transport the mails, troops, public stores, supplies, etc., giving the Government a preference in the use of the lines, requiring them to be operated as one continuous line, and other provisions before alluded to, which are unquestionably permanent, not discharged or dispensed with by alienation, but following the property into whosoever hands it may go, with that used in the special provisions under consideration, it will be seen that there is nothing in this language to warrant the claim that these special provisions intended as security are any less permanent or more affected by alienation, so long as the debt is unpaid, than are the other class referred to.

In each case the nature and reason of the requirement mark its duration, the one permanent, because the necessity for it is permanent and the language indefinite as to duration, the other, until the debt is paid, because the necessity for it has that duration. (22 Op. A. G., 396.)

On February 27, 1911, the Comptroller of the Treasury in a decision to the Secretary of War held that all compensation for transportation earned by a portion of this particular road for transportation for the Government should be withheld and applied on the Government's subsidy claim. The decision, however, was recalled by the comptroller and another given to the effect that only one-half of such transportation charges should be withheld and applied to the subsidy debt.

CONCLUSIONS AND RECOMMENDATIONS.

I regret to find myself unable to concur in the conclusions reached by Attorney General Griggs and the Comptroller of the Treasury to the effect that only 50 per cent of the transportation charges earned by this 100 miles of railroad for transporting the mails, troops, munitions of war, supplies and public stores for the Government shall be now retained by the United States and applied on the subsidy-bond debt, and the other 50 per cent paid over to the company now owning or operating the road. My reasons for reaching a different conclusion will be stated with as much brevity as clearness will seem to permit.

The manifest policy and purpose of the act of July 1, 1862, amended and supplemented by the act of July 2, 1864, were to secure railroad and telegraphic facilities from the Missouri River westward to the Pacific Ocean. To effectuate this policy and carry out this purpose, Congress was willing to, and did, grant to the companies embarking in the enterprise large quantities of land as an absolute bonus and the loan of the Government's credit in millions of dollars.

The expressed conditions upon which these grants were made and accepted were that the company pay the bonds issued to the companies in aid of the construction of said roads at maturity, and that the roads and telegraph lines be kept in repair and use, and over the telegraph lines the companies should transmit dispatches and over the railroads transport the mails, troops, munitions of war, supplies, and public stores for the Government whenever required to do so by any of the departments thereof, the Government to have the preferential right to such use at reasonable rates of compensation, not to exceed the rates paid by private parties for the same kind of services.

Congress also took care to provide a means by which the payments of the credit extended were to be secured. By the terms of the act of 1862 it was provided that all compensation earned on account of services performed by the companies for the Government should be

retained by it and applied to the payment of the subsidy bonds and interest until the same were fully paid, and after the roads were completed and until said bonds and interest were fully paid at least 5 per cent of the net earnings of said roads should be annually applied to the payment thereof. (Sec. 6, act July 1, 1862.)

Section 5 of the act of July 2, 1864, so amended section 6 of the act of July 1, 1862, as to require only one-half compensation due the companies for services performed for the Government to be applied to the payment of the subsidy bonds, and by the act of March 3, 1871, the Secretary of the Treasury was directed to pay one-half such compensation charges to the companies. It can not from these later acts, however, be assumed that Congress at any time intended to remit this subsidy debt, or any part of it, but from all the legislation on the subject the fair inference is that at all times it looked forward to its ultimate payment and provided means to that end.

By the act of July 1, 1862, it was expressly provided that—

Wherever the word "company" is used in this act it shall be construed to embrace the words "their associates, successors, and assigns," the same as if the words had been properly added thereto. (Sec. 15.)

By the act of 1864, which changed the retention and application of all service charges to the retention and application of only one-half thereof to the bonded debt, Congress expressly reserved the right to alter, amend, or repeal said last-mentioned act. (Sec. 22.)

By the tenth section of the act of 1864, which subordinated the Government's lien on account of these subsidy bonds to the lien of the bonds of the companies covering the several roads, the Government expressly reserves its paramount lien on said roads with respect to the provisions relating to the transmission of dispatches, and the transportation of mails, troops, munitions of war, supplies, and public stores of the Government, in the following language:

And the lien of the United States bonds shall be subordinate to that of the bonds of any or either of said companies hereby authorized to be issued on their respective roads, property, and equipment, except as to the provisions of the sixth section of the act to which this act is an amendment, relating to the transmission of dispatches and the transportation of mails, troops, munitions of war, supplies, and public stores for the Government of the United States.

By the act of March 3, 1873, now sections 5260 and 5261, Revised Statutes, the Secretary of the Treasury was directed "to withhold all payments to any railroad company and its assigns" on account of freight or transportation over their respective roads of any kind to the amount of payments made by the United States for interest upon bonds of the United States issued to any such company and which shall not have been reimbursed, together with 5 per cent of net earnings, due and unapplied as provided by law. But this act gave to such railroad companies the right to sue for a recovery of such transportation charges "upon the law and the facts of the case."

The question now is whether under these laws and the present state of facts the Government must lose all of the principal debt of \$1,600,000 and an amount of interest paid thereon which more than equals the principal, and content itself with the comparatively insignificant sum arising from 50 per cent of the charges of the roads for carrying for the United States the mails, troops and public stores, etc., which for the year 1910 amounted to less than \$9,500, or whether it has any other and greater enforceable rights.

From an examination of several opinions of different Attorneys General and the Comptroller of the Treasury it will be seen that there is much disagreement and many conflicting opinions on the question here involved. This fact may in itself furnish some measure of justification for nonconcurrence on my part in some of the conclusions reached by these officers, which otherwise might appear in me presumptuous. That the opinions of these officers are entitled to great weight generally goes without saying. But it is quite apparent that, in reaching the conclusions in this case that the Government may not now retain and apply all transportation compensations earned for services for the United States in payment on the bonded loan, but shall pay over 50 per cent thereof to the company now owning and operating the road, there were inadvertently overlooked material facts, relevant provisions of law, and rulings of the United States Supreme Court, which, had they been noted and considered, would in all reasonable probability have led to a different conclusion.

The conclusion reached by the comptroller appears to be based on three considerations or reasons, viz, the fact that Attorney General Griggs in the opinion above referred to had held that only one-half of the transportation charges could or should be retained and applied on account of the bonded debt; (2) because of the existence of rule numbered 79 made by the Treasury Department to the same effect; and (3), upon the fact that the present owner of the road is not the original debtor, but one who acquired the road by purchase at judicial sale, defeating thereby the Government's right of set-off.

It may be that the comptroller had other reasons than those mentioned for his conclusion; but if so, they are not apparent. The two first grounds mentioned would seem to constitute justification for the comptroller, as an executive officer, for concluding and advising as he did, since he was warranted in assuming that Attorney General Griggs, who had given an opinion on the subject, was correct, without himself making an extended independent examination into the question. It would appear, therefore, that the correctness of the comptroller's opinion is dependent upon the soundness of the opinion of the Attorney General, unless the former was correct in holding that the right of set-off after the foreclosure of the first mortgage no longer existed in favor of the United States against the owner of the railroad on its claim for transportation services earned in carrying the mails, troops, and Government property. If it can be shown that the opinion of the Attorney General was erroneous and that the right of set-off, notwithstanding the foreclosure sale of the road, at this time exists in the United States against any claim for transportation charges made by the present owner of the road, the Government would seem warranted in changing its attitude and in asserting every right to recover on account of the subsidy bond debt.

There will now be pointed out what seems to be conclusive of the fact that so much of Attorney General Griggs's opinion of March 3, 1899, as, in effect, appears to hold that 50 per cent of the transportation charges for carrying the mails, troops, and property for the United States shall, notwithstanding the maturity of the bonds and the payment thereof by the Government, be paid over to the company in money, is erroneous.

As stated by the Attorney General himself, the question submitted to him for an opinion by the Secretary of the Treasury was as follows:

Whether the Treasury Department should recognize the validity of the foreclosure sale of Central Branch Union Pacific Railroad and pay in money the transportation service for the Government over that road instead of applying such compensation, in whole or in part, upon the subsidy debt of that company to the United States.

While the question as to what particular portion of the transportation charges should be paid in money to the company and what portion thereof should be retained and applied to the payment of the subsidy debt may be said to be involved in this question, yet it was not the real question submitted. The essence of the question submitted was: What effect did the foreclosure sale of the road have upon the rights of the United States with respect to such transportation charges earned by the then owner of the road? The question as to what portion of such charges should be retained and applied on the debt was a collateral or incidental question only and one which the Attorney General was not apparently asked to give an opinion upon. A full answer to the question submitted could have been made by saying that in so far as the right of the Government was concerned with respect to the application of such transportation charges it was unaffected by the foreclosure sale.

This is practically what he did say, and the most charitable and reasonable view to take of it is that this is all he intended to be understood as holding; but it is possible that, having in mind the holding of the Supreme Court in *United States v. Union Pacific Railroad* (91 U. S., 72) to the effect that the company had the right to demand and receive pay for one-half of such transportation charges, he felt constrained to so hold in this case without differentiating between the facts and conditions obtaining at the time the court made its ruling in the above case and the facts and conditions obtaining in this case at the time his opinion was given; but be this as it may, the facts and conditions were so different in the two cases at the time of the rendition of the opinions in the one case and the other that the holding of the court in the *United States v. Union Pacific Railroad*, supra, constituted no true precedent for a similar holding in this case at the time Attorney General Griggs rendered his opinion to the effect that the payment of one-half of such transportation charges should be paid over to the then owner of the Central Branch Union Pacific Railroad.

The material difference in the facts of the two cases was that at the time the United States sought to retain and apply the whole of such transportation charges to the subsidy debt of the Union Pacific Railroad Co. in the case above cited, the subsidy bonds were not then due and payable, whereas at the time the Attorney General rendered his opinion the subsidy bonds issued to the Central Branch Union Pacific Railroad Co. were all due and payable. This difference was a vital one.

The Government in the Union Pacific case, it will be remembered, had answered the claim of the company to payment for transportation charges with a counterclaim for interest paid on the subsidy bonds. This was prior to 1875—more than 20 years before the subsidy bonds matured. The court, in its opinion, while recognizing the general right of set-off to exist in the Government in settling with those having claims against it, held that the counterclaim interposed

by the Government in the case at that time could not be allowed, because the company was not required to reimburse the Government for the claim for interest paid on the subsidy bonds until the maturity of the bonds. In short, the court held that until the bonds matured the company had a right to demand, and the Government was bound to pay, one-half of the transportation charges, but in its opinion expressly declared that—

if * * * the corporation is found to be now the debtor of the United States, the deduction for interest paid on the bonds can be lawfully made.

A fundamental question considered and discussed in the opinion of the Union Pacific case was whether the interest paid by the United States on account of the subsidy bonds was at that particular time due and payable from the company to the Government. It was held by the court that the act of March 3, 1873, had not so amended the acts of July 1, 1862, and July 2, 1864, as to change the date of payment of the bonds and interest "at maturity," but that under this statute constituting the charter of the company and the contract between it and the United States, reimbursement for interest paid was not demandable from the company until maturity of the bonds upon which such interest had accrued. In short, the reason why the Government could not retain and apply all such transportation charges to reimburse itself for interest paid on the bonds was because such interest was not then demandable, and for the same reason it could not be successfully pleaded as a counterclaim or set-off in an action by the company to recover one-half of such charges; but when the court declared, as it did, that—

if the corporation is found to be now debtor to the United States, the deduction for interest paid on the bonds can be lawfully made,

the conclusion is irresistible that when the bonds had matured the whole of the transportation charges could and should then be retained and applied, at least to the extent of the interest paid thereon for which the Government had not been reimbursed.

In 1899, when Attorney General Griggs rendered his opinion, all the bonds granted to the Central Branch Union Pacific Railroad Co., and interest thereon, had become due and had been paid by the Government. The road was then debtor to the Government on account of money so paid, for which it had not been reimbursed, and it is my opinion that it was an error for the Attorney General to hold and say that under those conditions only one-half of the transportation charges could be retained and applied to the debt due from the road to the Government, unless it shall appear that the rights of the Government with respect to such charges had become, as viewed by the Comptroller of the Treasury, altered or lessened by reason of the foreclosure of the so-called first mortgage. To this proposition attention is now directed.

That the foreclosure of and sale under the first mortgage did not alter or lessen the rights of the Government with respect to retaining and applying such transportation charges to reimburse itself for moneys paid by it on account of the subsidy bonds after they matured, attention is again invited to the provisions of the statutes. It will be seen that by the terms of section 6 of the act of July 1, 1862, it is made a condition, *inter alia*, upon which the grants aforesaid were made and accepted that the "company shall pay said bonds at

maturity," allow the transportation charges for services performed by the company for the Government to be retained and applied to the payment of the subsidy bonds and interest—

and after said road is completed until said bonds and interest are paid at least 5 per cent of the net earnings of said road shall be annually applied to the payment thereof.

By section 14 of the same act it is provided that —

wherever the word "company" is used in this act it will shall be construed to embrace the words "their associates, successors, and assigns" the same as if the words had been properly added thereto.

The only rational conclusion to be drawn from the above quoted provisions is that when construed together they are to be taken to mean and declare that all the obligations imposed upon the original companies receiving the grants aforesaid were imposed upon their "successors and assigns" until discharged by performance, except in so far as they may have been changed or modified by subsequent acts. To what extent these obligations have been performed has been shown.

To what extent they have been modified or changed by subsequent acts will be pointed out. The provision as to the portion of transportation charges to be presently applied to the payment of the subsidy debts was changed by section 5 of the act of July 2, 1864, March 3, 1871, and March 3, 1873. By the first of these acts it was provided that only one half of such charges should be applied, without mentioning what disposition should be made of the other half; by the second act the other half was directed to be paid to the road, and by the third it was directed that the Secretary of the Treasury should "withhold all payments to any railroad company and its assigns on account of freight or transportation over their respective roads, of any kind, to the amount of the payments, made by the United States for interest upon bonds of the United States issued to any such company and which shall not have been reimbursed, together with 5 per cent of net earnings due and unapplied as provided by law," but giving to the company the right to bring suit in the Court of Claims to recover the price of such freight and transportation where the rights of the company to recover the same upon the law and the facts of the case might be determined.

Under the "law and the facts" in the first and only case that was brought in the Court of Claims under these provisions it was held, as heretofore stated, that the United States could not retain and apply more than one-half such transportation charges until the maturity of the bonds.

Another provision of the statute affecting the Government's claim, so far as its security therefor is concerned, is section 10 of the act of July 2, 1864. As above stated, this amendment authorized the companies to issue their bonds on their roads to the amount of the subsidy bonds, and made the lien of such bonds paramount to the subsidy bond lien of the United States—

except as to the provisions of the sixth section of the act of which this act is an amendment, relating to the transmission of despatches and the transportation of mails, troops, munitions of war, supplies, and public stores for the Government of the United States.

From the foregoing the following deductions are made and given as my opinion with respect to transportation charges and the rights of the Government in relation thereto:

(1) That after the maturity of the subsidy bonds and their payment by the United States it was the right of the Government and the duty of its officers by virtue of such payments to exercise the general right of set-off under the provisions of section 5260 of the Revised Statutes, and withhold and apply all transportation charges to reimburse itself for payments so made.

(2) That to do this was as much one of the rights of the Government as was its right to exact performance of the services themselves.

(3) That this right was one continuing until the United States was fully reimbursed for the principal and interest it had so paid.

(4) That this right was paramount to the so-called first mortgage lien, and made so by the fifth section of the act of July 1, 1862, and the exception contained in the tenth section of the act of July 2, 1864.

(5) That such rights being paramount and the United States not having been brought in as a party to the foreclosure proceedings referred to its rights were unaffected thereby.

(6) That the obligation of the successor to the Central Branch Union Pacific Railroad to perform transportation services for the Government and have the charges therefor so withheld and applied was no less than, but the same as, the obligation imposed on its originally subsidized predecessor in title, and so made by the provisions of sections 6 and 15 of the act of July 1, 1862; and

(7) That all such transportation charges earned since the maturity of the subsidy bonds and payment thereof by the United States by whatsoever company should have been withheld and applied by the Government as reimbursements, and hereafter all such transportation charges should be so withheld and applied.

AS TO 5 PER CENT OF THE EARNINGS.

The opinion of the Attorney General (22 Op. A. G., 401-402), discussing the effect of the foreclosure proceedings upon the rights of the Government in the premises, says:

It can not be conceived that Congress in providing a security for these vast sums should intend one so precarious as would be this, and the one requiring 5 per cent of the net earnings to be applied upon these bonds, and the one making the payment of the bonds at maturity a condition of the grants made if the company building the road could, after receiving all the bonds and lands, transfer the property so that it and the purchaser would be absolved from each and all of these obligations and requirements.

For it will be observed that if the sale in this case can have any such effect it is because the sale itself *proprio vigore* does this, and not at all because of the reason or occasion of the sale or of whether it was forced or voluntary.

By comparing the language of these acts making provisions for the operation of the railroad and telegraph lines for the right of the Government to use them, at fair rates, obliging the companies to transport the mails, troops, public stores, supplies, etc., giving the Government a preference in the use of the lines, requiring them to be operated as one continuous line, and other provisions before alluded to, which are unquestionably permanent, not discharged or dispensed with by alienation, but following the property into whosoever hands it may go, with that used in the special provisions under consideration, it will be seen that there is nothing in this language to warrant the claim that these special provisions intended as security are any less permanent or more

affected by alienation, so long as the debt is unpaid, than are the other class first referred to.

In each case the nature and reason of the requirement mark its duration, the one permanent, because the necessity for it is permanent, and the language indefinite as to duration, the other, until the debt is paid, because the necessity for it has that duration * * *.

This appears to be the correct and only reasonable interpretation to be given the provisions of the statutes under consideration. No other correct conclusion seems possible to be drawn as to the meaning of these statutes without ignoring the provision in section 15 of the act of 1862, which fixes the liability on the successors and assigns of the original company to pay the 5 per cent net earnings, and other like provisions, as of the original company was required, until the whole debt is paid. If, as the Attorney General has held, the obligation to pay the 5 per cent net earnings on said debt follows the property into whosoever hands it may pass, it is the duty of the present company to keep a separate account of the earnings of this road, report the same to the Secretary of the Interior, and pay the Government 5 per cent of the net earnings which said road may have, and it should be required to account for any net earnings which it may now have, and which it may hereafter have, and pay 5 per cent thereof over to the United States.

Another question which arises in this case of equal if not superior importance to all others is the one with reference to the legal obligation of the present owner of this road to pay his subsidy bond debt, as a personal obligation. It seems quite clear that Congress in and by the provisions of sections 6 and 15 of the act of July 1, 1862, sought to provide, and did provide, the Government with two kinds of security for the payment of the subsidy debt, viz, personal and collateral. The first and foremost condition upon which the grants of lands and bonds were made was that the company should pay the bonds. This provision for payment is the imposition of a positive, personal obligation to pay. This personal and direct obligation should not be confused with the provisions of the same section of the act which make the subsidy bonds a lien upon the railroad and telegraph property as collateral security for their payment. The provision fixing the personal obligation upon the original company to pay the bonds is as definite and certain as is the one providing collateral security in the nature of a lien upon the road for the same purpose.

It is made clear by the provisions of sections 6 and 15 of the same act that Congress intended that this positive personal obligation to pay the bonds should not be limited to the original company, but should follow the property into hands of all others who might acquire it until the debt was extinguished, in declaring that "wherever the word 'company' is used in this act, it shall be construed to embrace the words 'their associates, successors, and assigns,' the same as if the words had been properly added thereto." This leaves the law touching the question of personal security the same as it is read, "the grants aforesaid are made upon the condition that said company, its associates, successors, and assigns shall pay said bonds at maturity," etc.

It is difficult to perceive how it can be claimed that the present owner of this road can be relieved of the obligation to pay this debt,

without ignoring or nullifying this plain letter of the statute. Any one purchasing the property at the judicial sale, or at a voluntary sale of the property, would purchase it with a knowledge of the obligations which this public statute imposed. The obligation of such a purchaser would appear to be as much a personal obligation by assumption of the debt as would be the obligation of a grantee to pay a mortgage upon real estate that he might acquire by a deed wherein was recited the existence of such mortgage, and that the grantee assumed and agreed to pay the same.

While this proposition, like many others arising from time to time in public administrative affairs, may not be free from doubt, it is clear to me that any such doubt should be resolved in favor of the United States by the executive officers, and if this statute which, in plain and unequivocal language, declares that the present owner of the property as the successor and assignee of the original company shall pay this debt is to be stricken down or declared to no longer possess any legal vitality it should be left to the courts to so do and declare.

As before mentioned, section 4 of the act of March 3, 1887, provides:

That whenever, in the opinion of the President, it shall be deemed necessary to the protection of the interests and the preservation of the security of the United States in respect to its lien, mortgage, or other interest in any of the property of any or all of the several companies upon which a lien, mortgage, or other incumbrance paramount to the right title, and interest of the United States for the same property, or any part of the same, may exist and be then lawfully liable to be enforced, the Secretary of the Treasury shall, under the direction of the President, redeem or otherwise clear off such paramount lien, mortgage, or other incumbrance by paying the sums lawfully due in respect thereof out of the Treasury; and the United States shall thereupon become and be subrogated to all rights and securities theretofore pertaining to the debt, mortgage, lien, or other incumbrance in respect of which such payment shall have been made. It shall be the duty of the Attorney General, under the direction of the President, to take all such steps and proceedings, in the courts and otherwise, as shall be needful to redeem such lien, mortgage, or other incumbrance, and to protect and defend the rights and interests of the United States in respect of the matters in this section mentioned, and to take steps to foreclose any mortgages or liens of the United States on any such railroad property.

This property was bought in upon the foreclosure of the first mortgage for \$2,350,000. The present assessed value of the road is \$3,500,000. Thus there would appear to be a difference of \$1,150,000 between the present value of the road and the principal amount necessary to be paid to redeem, excluding from consideration the amounts expended on the roads since the foreclosure in the form of permanent betterments.

Since the United States loan of \$1,600,000 and the bond loan of an equal amount may be presumed to have been put into this property, amounting in the aggregate to \$32,000 per mile, or \$3,200,000 for the 100 miles, to say nothing of the money expended thereon arising from the sale of the 223,080 acres of land patented to the company, it is highly probable that the present value of this road and telegraph property is from \$40,000 to \$45,000 per mile, or in the aggregate from \$4,000,000 to \$4,500,000.

Other mortgage bonds have since the foreclosure been floated upon the property which are junior and inferior liens to the lien of the Government to the extent that they may exceed the purchase price paid for the road at foreclosure and the amount since expended for betterments. The owner could not in equity claim both the interest

upon the purchase price paid at the foreclosure sale and also the use and enjoyment of the property. It is fair to assume that the profit arising from the use of the property would equal or exceed the interest charge upon the purchase price of the property at foreclosure sale. It is my judgment that the present owner of the road and the bondholders who have a lien thereon inferior to the lien of the United States would never allow this property to be resold upon foreclosure of the Government's subsidy bond lien and taken over by the United States, but would pay said subsidy debt if pressed by foreclosure proceedings and redemption which are authorized by the provisions of section 4 of the act of March 3, 1887, above referred to, when the President may so direct.

I would therefore recommend:

(1) That so much of Treasury Department Circular No. 79, dated April 18, 1895, or any other Treasury order which, in effect, directs the payment of one-half of the transportation charges over this road be paid to the company earning the same should be revoked, and all such charges should be retained by the Treasury Department and applied to reimburse the Government for interest paid on said subsidy bonds.

(2) That the Secretary of the Interior should forthwith make demand upon the present owner of said railroad for reports of said road which it is now in default of to that officer.

(3) That demand should be made upon the present owner of the road to pay or reimburse the Government for principal and interest paid on account of the subsidy bonds issued and paid by the Government in aid of the construction of this road.

(4) That in the event of the failure on the part of the present owner of the road to reimburse the Government, as aforesaid, that an action be directed to be brought to foreclose the Government's subsidy bond lien and for a sale of said road and telegraph line, for an accounting of its net earnings, and for a personal judgment against the present owner of the road for any deficiency which remains unpaid upon said lien and judgment after proper application of the proceeds of said sale.

(5) That, if it becomes necessary to protect its interest and to secure reimbursement for the moneys expended on account of the subsidy bonds, the United States bid in at the foreclosure sale and take over said road and telegraph properties, and should it be determined that the act of March 3, 1887, did not amount to an appropriation for that purpose, Congress be asked to appropriate a sum sufficient therefor.

It is my candid conviction that if these steps are taken with that vigor and determination which the magnitude and importance of the claim demand, the United States will ultimately receive satisfaction of at least the principal of this claim.

Respectfully submitted.

W. T. THOMPSON,
Solicitor of the Treasury.

C.

DEPARTMENT OF JUSTICE,
OFFICE OF THE SOLICITOR OF THE TREASURY,
Washington, D. C., March 29, 1913.

The SECRETARY OF THE TREASURY.

SIR: Between July 27, 1866, and January 21, 1868, the United States issued subsidy bonds in favor of the Central Branch Union Pacific Railroad Co. to the amount of \$1,600,000, to aid in the construction of 100 miles of railroad extending from Atchison to Waterville, Kans. These bonds have never been paid and there is now due the Government thereon in the neighborhood of \$4,500,000.

In response to a request from Secretary MacVeagh in 1911 to investigate and report to him the condition of this claim, with recommendations, such a report was rendered by me on the 27th of July, 1911. This report was laid before President Taft by the Secretary and thereafter, in March, 1912, the same was referred to the Attorney General for advice.

On January 27, 1913, an opinion was prepared in the office of Attorney General Wickersham, advising the President that he was unable to agree with the recommendations made in said report as to the steps to be taken to protect the interests of the Government growing out of said claim. I have carefully read this opinion and I can not believe that the one who prepared it understood either my report or the true legal status of the claim. That the report was not understood is manifest from the second sentence contained in the opinion, wherein it is erroneously stated that—

This report recommended certain action be taken based on the assumption that the Government still retains a first lien upon so much of the Missouri Pacific Railroad as is embraced in the old Central Branch Union Pacific.

I can not believe there is anything in my report to indicate that it was based on any such assumption. At any rate, no such assumption was indulged in by me. The report everywhere recognizes that the first lien on this road is the lien created by the mortgage securing the bonds which were authorized by Congress and issued by the company under the act of July 2, 1864, and which act subordinated the Government's subsidy bond lien to the bonds authorized to be thus issued by the railroad company, except as to the obligation of the railroad company to transport the mails, troops, and public stores of the Government and the application of the charges therefor to the payment of the subsidy debt owing to the United States, which was expressly excepted in the act of 1864.

That said report did not assume that the Government had a first lien on the railroad property, but held that the United States had a lien inferior to the bonds issued by the company under the act of 1864, is specifically shown at pages 7, 32, and 33, and particularly at pages 52 and 53, where it is expressly stated that the amount necessary to redeem from the judicial sale under the first mortgage bonds would be at least \$2,350,000. I held, however, as appears on pages 49 to 52, inclusive, of said report, that an important question arose as to whether the present owner of the road was not under a personal obligation to pay these bonds, not by reason of any first lien on the property, but by virtue of the provision of the statute requiring the

companies authorized to construct said railroad and to whom the subsidy bonds were loaned to pay them at maturity, and the further provision therein that the word "company," as used in the act, is directed to be construed as embracing the words "their associates, successors, and assigns," and that while there might be doubt as to such personal liability on the part of the present owner of the road, as successor in ownership of the property, the doubt should be resolved in favor of the United States by the executive officers, and that if this language that appeared to cast upon the present owner of the road the personal obligation to pay this debt, as successor in title, was to be rendered nugatory under present conditions it should be left to the courts to so decide.

I further held that, after the maturity of the principal subsidy bond debt, it was the right of the Government and the duty of its officers to withhold and apply all charges the present owner of the company might have from time to time against the Government on account of carrying United States mails, troops, and Government stores over this particular 100 miles of road toward the payment of the interest paid by the United States on this subsidy bond debt. This holding was based upon the consideration of section 10 of the act of 1864, which, while subordinating the subsidy bonds of the Government to the first bonds of the company, nevertheless provided that this subordination of the Government's lien should not apply to the sixth section of the act of 1862, as follows:

Except as to the provisions of the sixth section of the act to which this act is an amendment relating to the transportation of dispatches and the transportation of mails, troops, munitions of war, supplies, and public stores for the Government of the United States.

My conclusion was also based upon section 5260 of the Revised Statutes, the latest expression of Congress upon this particular subject, which is as follows:

Sec. 5260. The Secretary of the Treasury is directed to withhold all payments to any railroad company and its assigns, on account of freights or transportation over their respective roads of any kind, to the amount of payments made by the United States for interest upon bonds of the United States issued to any such company and which shall not have been reimbursed, together with 5 per centum of net earnings due and unapplied, as provided by law.

Also upon the opinion of Attorney General Devens, rendered June 30, 1880, to the Secretary of the Treasury (16 Op. A. G., 517), wherein he held that all such charges for transportation should be withheld and applied to the payment of the interest upon said subsidy bonds; the opinion of Attorney General Miller (20 Op. A. G., 11) rendered to the Secretary of the Navy; the opinion of the Attorney General through the Solicitor General (17 Op. A. G., 512); and the opinion of the Supreme Court of the United States in *United States v. Union Pacific Railroad Co.* (91 U. S., 79), wherein it was held in substance that after the maturity of the principal subsidy bond debt the whole of the transportation charges might be withheld to reimburse the United States for interest paid by it (the Government) on the subsidy bonds.

In my report to the Secretary it was held that the right to withhold and apply all of such transportation charges was a right paramount to the lien created by the company's first-mortgage bonds, because of the express language of section 10 of the act of 1864, which

in terms made it so; and that such right followed the property into the hands of subsequent owners and was unaffected by the foreclosure proceedings had in the foreclosure of the mortgage securing the first-mortgage bonds issued by the railway company. It is conceded that the right to retain and apply one-half of such transportation charges toward the payment of the subsidy bonds followed the property into the hands of the present owner as successor to the original company through mesne conveyances. This right arises from the same character of authority as the right I claim the Government now has to apply the whole of such charges, namely, the Federal statutes.

The former right springs from the act of 1864, which also provided, *inter alia*, that Congress might at any time "alter, amend, or repeal said act"; the latter from the act of 1873, now section 5260 Revised Statutes, which directs the Secretary of the Treasury—

to withhold all payments to any railroad company and its assigns, on account of freights or transportation over their respective roads of any kind, to the amount of payments made by the United States for interest upon bonds of the United States issued to any such company, and which shall not have been reimbursed, etc.

To this extent the act of 1873 modified the act of 1864. This latter act, however, further provided that, for any such charges so withheld, the railway company might bring suit in the Court of Claims to recover the price of such charges and have it judicially determined whether, under the law and facts in each case as it might arise, the Government might apply all such charges to the payments of its claim for interest as aforesaid or whether one-half thereof should be paid to the company.

The only case ever brought by a railroad company under this law to recover one-half of these charges where it had all been withheld, was the case of the *United States v. Union Pacific Railroad Co.* (91 U. S., 72). This suit was brought in the Court of Claims long before the principal of the subsidy bond debt was due, and the Supreme Court held that the United States at that time could not withhold and apply more than one-half of the transportation charges, solely because at such time the interest on the principal debt which the United States had paid was not due and demandable from the company to the Government and would not become due and demandable until the principal bonds were due, but expressly declared that—

if on a fair interpretation of it (the statute) the corporation is found to be now a debtor to the United States, the deduction for interest paid on the bonds can be lawfully made.

It will thus be seen that the only reason why all of the transportation charges might not then be withheld and applied on account of interest payments made on the subsidy bond debt by the United States, was that it did not then have a matured claim against the company therefor, and would not have, until the principal of the bonds was due. Hence the conclusion seems irresistible, that when the interest did become due and payable from the railroad company to the United States upon the maturity of the principal of the bonds, the United States then had a case which fell clearly within the rule announced by the Supreme Court in the case above referred to. The railroad company has now been debtor to the United States on account of the principal and interest on these bonds for a period of from 14 to 16 years, and neither principal nor interest has been paid.

In consideration of these statutes and this holding of the Supreme Court, I recommended that the United States had the right, and it was made the duty of its officers, to do what section 5260 of the Revised Statutes directs, and retain and apply all of the transportation charges earned thereafter to reimburse the Government for the interest it had paid on account of these subsidy bonds. In the opinion of Attorney General Wickersham, however, it is stated that this recommendation is not concurred in. The reasons assigned for his non-concurrence, in my judgment, are far from convincing, and are contrary to the opinion of a number of his predecessors, diametrically opposed to the doctrine laid down by the Supreme Court in *United States v. Union Pacific Railroad Co.* (91 U. S., 72), and the plain language of the act of 1873; and I respectfully submit whether in the face of the statute which commands it, the decision of the court which authorizes it, and the opinions of a number of the Attorneys General that advise it, it would not, as previously recommended by me, be in keeping with a prudent administrative policy to hereafter retain all such transportation charges earned by the present owner of this road on account of service rendered, and in the event the railway company is unwilling to acquiesce therein, allow it to bring suit in the Court of Claims to recover them, as it is provided it may by the terms of section 5261 of the Revised Statutes, and have this matter judicially and finally determined.

AS TO 5 PER CENT NET EARNINGS.

The sixth section of the act of July 1, 1862, directs that—

After said road is completed and until said bonds and interest are paid at least 5 per cent of the net earnings of said road shall also be annually applied to the payment thereof.

This provision, with its consequent obligation, was not changed by the amendatory act of 1864 or by any subsequent legislation. Attorney General Griggs (22 Op. A. G., 401) held that this statute imposed an obligation which followed this bond-aided railroad into the hands of any subsequent owner who might acquire the property either through forced or voluntary sale, and that the duration of this obligation was measured by the duration of the debt owing to the Government by reason of the subsidy bonds, and that the foreclosure of the first mortgage lien did not affect this liability.

In my report to the Secretary of the Treasury I called attention to the fact that since the foreclosure of the first mortgage no effort had been made to collect any part of the 5 per cent net earnings, and that no report of the gross or net earnings of this road had been made to the Government since 1903, to enable it to ascertain whether there was any amount due the Government from that source, and suggested that the statute should now be complied with as directed by the act of June 25, 1868 (15 Stats., 79), and the acts approved June 19, 1878 (20 Stats., 169), and March 3, 1903, amendatory thereof, and that said railroad be required to report the amount of its earnings to the Secretary of the Interior annually.

This recommendation is not concurred in by Attorney General Wickersham. He says:

The Government has no right to demand the annual payment of 5 per cent of the net earnings.

This follows, he says—

because the right to 5 per cent of the net earnings was intended as a security and sinking fund for the Government's loan, and therefore its existence depends upon the existence of the debt.

It is difficult to ascertain just what the Attorney General means by this last expression, that the right of the Government to the 5 per cent net earnings is dependent upon the existence of the debt. That the debt exists there is no question. Hence, if the existence of the right rests upon the existence of the debt, it would seem that the right to the 5 per cent net earnings has quite a firm foundation, since the debt, instead of ceasing to exist, has been increasing from year to year.

His position on this matter seems to be based on the opinion of the Supreme Court in *Union Pacific Railroad Co. v. United States* (99 U. S., 402), where it held that when the Government subordinated its lien by the act of 1864 it subordinated its whole debt; that the holders of the company's first mortgage bonds, to which it had given the priority over its own debt and security, were entitled to payment of interest out of net earnings in priority to the payment of 5 per cent net earnings due the Government; and that the effect of the act of 1864 was to displace and subordinate the Government's position as creditor.

The facts recited by Attorney General Wickersham with reference to the holding of the court were fully recognized in my opinion and report to the Secretary of the Treasury (see p. 23 of report to Secretary MacVeagh); but there is a matter which was taken into consideration in my report, which was not considered in the opinion of the Attorney General, in connection with the 5 per cent net earnings, of material importance to the present status of this claim and the interest of the Government. It is this: That when the first mortgage bonds were foreclosed all rights arising by virtue of the company's first mortgage were fully foreclosed so far as this railroad property was concerned. The property itself was thereafter charged with no lien whatsoever on account of said first mortgage bonds. The purchaser at the judicial sale took the property shorn of every lien against it except the second mortgage lien of the Government created by the subsidy bonds. Of course the purchaser at that judicial sale had the right to demand full redemption by the payment of the amount which the purchasing company paid for it at judicial sale, and lawful interest thereon, before the Government could resort to the property for the satisfaction of its debt.

But at this point it seems clear that the Government has the right to know, through reports to be made by the owner of the road to the Secretary of the Interior, the amount of its net earnings, if it has any, since the foreclosure, and if there are more net earnings annually than necessary to pay the lawful rate of interest on the amount of the money for which the property sold at the judicial sale, and on any sum added to the road as betterments, then under the opinion of Attorney General Griggs, that the obligation to pay 5 per cent of the net earnings followed the property into the hands of subsequent owners the Government would be entitled to the annual reports, demanded by the statutes, from the present owner of the road, so that

it might determine for itself whether any sum is due and should be paid over on account of net earnings.

I did not hold, as Attorney General Wickersham's opinion intimates I did, that the United States was entitled to 5 per cent of the net earnings under any and all circumstances; but did hold that the reports of earnings should be made to the Secretary of the Interior, and that the present company should be required to account therefor, and if it had annual net earnings over the amount necessary to satisfy the lawful annual interest on the first-mortgage bonds before foreclosure or the sum paid for the property at foreclosure, 5 per cent thereof should be paid and applied on this subsidy debt.

This is the only claim the Government now has on account of the subsidy bonds issued to aid in the construction of the Pacific railroads. All other bond-aided railroads have paid their subsidy loans, and it would seem that now, after a lapse of 45 years from the date of the bonds, matters should be brought to a final conclusion with respect to this, the only remaining unsatisfied claim. It must be apparent to everyone that if no effort is made to collect it, it will never be paid.

Believing that some signs of life should now be manifested in a bona fide effort to collect a claim which had remained in a state of suspended animation for more than 15 years since falling due (except for the application of one-half of the charges for transportation, which do not exceed 10 per cent of the annual interest charge on the debt), in my report to Secretary MacVeagh it was recommended, in substance, (1) that all charges for transportation services over this particular 100 miles of road on behalf of the Government should be withheld; (2) that the Secretary of the Interior should make demand upon the present owner for reports relative to the annual net earnings of this road; (3) that demand should be made upon the present owner to satisfy the claim of the Government on account of the subsidy bond debt, by compromise under section 3469, Revised Statutes, or otherwise, and in the event it failed or refused to do so; (4) that an action be directed to be brought in the name of the Government against the present owner of the road to foreclose the Government's second lien and to redeem said property from the sale under the first-mortgage foreclosure, and that in such proceedings prayer should be made for an accounting relative to transportation charges and 5 per cent net earnings and a judgment for any deficiency which might remain unpaid from the proceeds of the sale, in order that the questions of the right of the Government, respectively, to such transportation charges, the 5 per cent net earnings, and the personal obligation of the present owner of the road to satisfy the Government's claim might be finally determined. It may be that other or better means to collect this claim may be devised, but I believed then and still believe that if the means suggested are employed, a very substantial portion of this claim can be realized.

The first of these recommendations the Secretary can carry out by revoking so much of Treasury Department Circular No. 79 of April 18, 1895, as now directs the payment of one-half of the transportation charges to be made to the present owner of the railroad, and by directing the proper officers that the whole of such charges be now retained and applied to compensate the Government for the interest paid on said subsidy bonds. The other recommendations

can be complied with by the Secretary of the Treasury only by the direction of the President, acting under the authority of section 4 of the act of March 3, 1887.

Fearing that the opinion of the Attorney General referred to might be construed as a recommendation that it is not advisable for the Government to take any further steps or make any further efforts to collect this claim, I have considered it my duty to make you acquainted with the situation and submit the matter for your consideration, and respectfully suggest that the question of redemption of the property from the first mortgage foreclosure sale and the foreclosure of the lien of the United States would be proper for you, in the exercise of your discretion, to submit to the President for any direction in relation thereto which he may see fit to give under section 4 of the act of March 3, 1887 (24 Stats. L., p. 491).

Copies of my report to Secretary MacVeagh and of the opinion of the Attorney General are submitted herewith.

I have the honor to remain, very respectfully,

W. T. THOMPSON, *Solicitor*.

D.

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, June 27, 1910.

THE ATTORNEY GENERAL.

SIR: I have the honor to invite your attention to the existing indebtedness of the Central Branch Union Pacific Railroad Co. to the United States on account of principal and interest of bonds issued in aid of the construction of said road, under the acts of Congress of July 1, 1862 (12 Stat., 489), and July 2, 1864 (13 Stat., 356).

The amount of the indebtedness, as of June 1, 1910, is as follows:

Principal.....	\$1,600,000.00
Interest.....	2,057,246.32
Total.....	3,657,246.32

The annual report of the Attorney General for the year 1897 (p. iv) refers to foreclosure proceedings against the Central Branch Union Pacific Railroad Co., pending at that time, but this department is not advised whether the said proceedings were finally concluded or are still pending.

With the view of ascertaining if any means exist through which the United States may secure an adjustment of the said indebtedness, I would be pleased to be advised of any information possessed by your department which will show the present status of the Government's claim against the road, together with your opinion as to whether any further or new proceedings might be instituted for the recovery of the debt.

It appears that the road was leased for a term of 25 years from December 31, 1885, and is controlled by the Missouri Pacific Railway Co.

Respectfully,

FRANKLIN MACVEAGH,
Secretary.

E.

DEPARTMENT OF JUSTICE,
Washington, D. C., June 30, 1910.

The SECRETARY OF THE TREASURY.

SIR: I beg to acknowledge the receipt of your letter of the 27th instant, in which you call attention to the indebtedness of the Central Branch, Union Pacific Railroad Co., to the United States, on account of the bonds issued in aid of the construction of that road, and inquire whether any means exists through which an adjustment of this claim may be secured.

From an opinion of Attorney General Griggs, of March 20, 1899 (22 Opins., 396), it appears that this railroad property was foreclosed and sold under a mortgage which was prior to the subsidy bonds above mentioned. It is stated therein that a final decree directing the sale of the property was entered on February 7, 1898; that this sale was made; that it was confirmed by the court on June 27, 1898, and that a deed was made shortly thereafter conveying the whole property to the purchasers.

In that opinion it is further stated that—

While the United States is named as a defendant in the bill of complaint in this suit, yet no subpoena, citation, or other process was issued or served upon it, nor did it appear or become a party in the case, and is, therefore, not barred by said decree or sale; and if the whole property were of sufficient value to pay any considerable portion of this subsidy claim beyond the amount due on said first mortgage and costs, the United States might still redeem the property or cause its resale on account of its subsidy lien, but, as I understand, it is not.

I shall be pleased if you will advise me whether you have any information which would indicate that the Government would now be justified in taking the action which Attorney General Griggs suggested might be taken if the property were of sufficient value to pay any portion of the subsidy claim over and above the first mortgage and costs.

That opinion considered the question whether the foreclosure and sale discharged the railroad property from the various obligations and requirements of acts of Congress as to its operation and use, and especially a requirement that a portion of the amount which might be due, from time to time, from the Government for transportation service, should be applied in part payment of these subsidy bonds. The conclusion reached is that—

* * * One-half of the compensation due from time to time for services rendered for the Government over the railroad and telegraph line referred to in your communication should be withheld and applied upon the bonds issued by the United States in aid of the construction of that railroad and telegraph, notwithstanding said foreclosure and sale.

I assume, therefore, that, in computing the amount of the Government's claim, credit was given for any amounts withheld and applied upon bonds in accordance with this opinion.

Respectfully,

WM. S. KENYON,
Acting Attorney General.

F.

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, October 20, 1910.

DEAR MR. SOLICITOR: I am informed that you have had some conversation with Assistant Secretary Andrew and with ex-Congressman Coombs upon the indebtedness of the Central Branch Union Pacific Railroad to the United States now held in our accounts and amounting to \$3,655,563. I should be glad if you would look further into this matter and would report to me as to the advisability of our taking action looking toward the recovery of this sum from the successors of that road.

Very truly, yours,

FRANKLIN MACVEAGH,
Secretary.

The SOLICITOR OF THE TREASURY.

G.

DEPARTMENT OF JUSTICE,
OFFICE OF THE SOLICITOR OF THE TREASURY,
Washington, D. C., October 27, 1910.

The SECRETARY OF THE TREASURY.

SIR: I beg leave to acknowledge the receipt of your communication of the 20th instant, requesting me to look into the matter of the indebtedness of the Central Branch Union Pacific Railroad to the United States, and to report to you as to the advisability of taking action toward the recovery of the same from the successors of that road.

I had hoped to be able to advise you by this time in the matter, but I find that it will be necessary to make an extensive investigation of the subject before I will be able to report.

I take this opportunity to advise you that I am at present making such investigation.

Very respectfully,

W. T. THOMPSON, *Solicitor.*

H.

DEPARTMENT OF JUSTICE,
OFFICE OF THE SOLICITOR OF THE TREASURY,
Washington, D. C., April 15, 1911.

GENTLEMEN: This office is investigating the claim of the United States against what is generally known as the Central Branch Union Pacific Railroad Co., and which is now a part of, and owned by, the Missouri Pacific system, running from Atchison to Waterville, Kans., in length about 100 miles. The claim grows out of \$1,600,000 of subsidy bonds issued and paid by the United States in aid of the construction of said road. A suit was instituted by the first-mortgage

bondholders against this road in 1898, in the United States court for Kansas, and at a foreclosure sale, shortly thereafter, it was purchased on behalf of the Missouri Pacific.

If you could, from the records of your office, give me information on the following points I would be pleased:

- (1) What have been the gross income, expenses, and net income of this branch of about 100 miles, the last four years or more?
- (2) What is the value, per mile, of such branch?
- (3) What is the present bonded indebtedness of said 100 miles?

Very respectfully,

W. T. THOMPSON, *Solicitor.*

The INTERSTATE COMMERCE COMMISSION.

I.

INTERSTATE COMMERCE COMMISSION,
Washington, April 17, 1911.

Hon. W. T. THOMPSON,
Solicitor of the Treasury, Department of Justice.

MY DEAR SIR: We are in receipt of yours of the 15th instant, requesting certain information with regard to the Central Branch Union Pacific Railroad, now a branch of the Missouri Pacific Railway system. As soon as the necessary data can be secured from our records we will reply as definitely as may be practicable to your questions.

Yours, very truly,

JUDSON C. CLEMENTS,
Chairman.

J.

INTERSTATE COMMERCE COMMISSION,
Washington, April 27, 1911.

Hon. W. T. THOMPSON,
Solicitor of the Treasury, Department of Justice.

MY DEAR SIR: Referring further to yours of the 15th instant, requesting certain information relative to the Central Branch Union Pacific Railroad, now a branch of the Missouri Pacific Railway system:

The last annual report rendered to the Interstate Commerce Commission by the Central Branch Union Pacific Railway Co. was for the year ending June 30, 1899. The line of this company, which was organized on June 29, 1898, extended from Atchison, Kans., to Waterville, Kans., 100 miles.

An annual report was made to the commission by the Central Branch Railway Co. for the year ending June 30, 1900. This company was organized on July 8, 1899. The report states that the company was—

formed by articles of agreement and consolidation between the Atchison, Colorado & Pacific Railway Co., the Atchison Jewell Co., and Western Railway Co., and the Central Branch Union Pacific Railway Co., whose charters were severally filed in the

office of the Secretary of State of the State of Kansas on the dates following, that is to say: The Atchison, Colorado & Pacific Railway Co., June 1, 1898, amended January 26, 1899; the Atchison Jewell Co. and Western Railway Co., June 1, 1898, amended January 26, 1899; the Central Branch Union Pacific Railway Co., June 29, 1898.

The length of the single track mileage owned and operated by the Central Branch Railway Co. on June 30, 1900, its report gives as 388.19 miles and evidently includes the mileage formerly belonging to the Central Branch Union Pacific Railway Co. The Central Branch Railway Co. through ownership of capital stock, according to its last (1909) report, was owned or controlled by the Missouri Pacific Railway Co.

The report rendered to the commission by the Missouri Pacific Railway Co., organized by contract and articles of consolidation dated May 29, 1909, filed in the offices of the secretaries of state of Missouri, Kansas, and Nebraska, August 9, 1909, includes the Central Branch Railway Co. (Inc.), in Kansas, by articles of consolidation, July 8, 1899, as one of its constituent companies.

As may be inferred from the foregoing statement, it is not possible for the commission to supply any separate statement of the revenues, expenses, etc., of the Central Branch Union Pacific Railway Co. subsequent to the year 1899.

Yours, very truly,

JUDSON C. CLEMENTS, *Chairman.*

K.

DEPARTMENT OF JUSTICE,
OFFICE OF THE SOLICITOR OF THE TREASURY,
Washington, D. C., May 16, 1911.

HON. HENRY A. WISE,
United States Attorney, New York City, N. Y.

SIR: In relation to the claim of the Government on account of subsidy bonds granted to the 100 miles of railroad extending from Atchison to Waterville, Kans., formerly known as the Central Branch Union Pacific Railroad Co., it would seem that the Government has a right to demand and receive 5 per cent of the net earnings of said railroad, and apply the same to the payment of said claim.

I am unable to ascertain here whether at the present time the Missouri Pacific Railroad Co., the present owner of said line of railway, has been, or is, keeping any separate account of the earnings and expenses of operation and maintenance of said road.

Not knowing the proper officer of the Missouri Pacific Railway system to address for this information, I would be pleased if you would obtain from the company a letter containing the information above suggested.

Also request the company to advise you what the gross and net earnings of said line have been for the years since 1898, if a separate account of the gross and net earnings have been kept, or a statement of the gross and net earnings of said line for such time as the Missouri Pacific Co. has had control thereof, either as owner or lessee.

When you receive this information kindly send me the letter of the company containing the same.

Very respectfully,

W. T. THOMPSON, *Solicitor.*

L.

195 BROADWAY,
New York, May 18, 1911.

HON. HENRY A. WISE,
United States Attorney, New York, N. Y.

SIR: I beg to acknowledge the receipt of your letter of May 17, inclosing copy of a letter from W. T. Thompson, Esq., Solicitor of the United States Treasury, making inquiries concerning the alleged claim of the Government on account of subsidy bonds granted to the 100 miles of railroad extending from Atchison to Waterville, Kans., formerly known as the Central Branch Union Pacific Railroad Co.

I will lay the letter of Mr. Solicitor Thompson before the officers of the company, and when I have received their answer to his inquiries I will advise you thereof.

Very truly, yours,

JOHN F. DILLON.

M.

195 BROADWAY,
New York, May 18, 1911.

HON. HENRY A. WISE,
United States Attorney, New York, N. Y.

SIR: Further answering your letter of May 17, inclosing one from W. T. Thompson, Esq., Solicitor of the Treasury, containing inquiries concerning what was formerly known as Central Branch Union Pacific Railroad Co., I have to say that I have made inquiries and am informed that the Missouri Pacific Railway Co., the present owner of the said line of railway, does not keep and has not kept any separate account of the earnings and expenses of operation and maintenance of the said 100 miles of railroad. That road is an integral part of the Missouri Pacific system and probably that may be the reason why no separate account has been kept of the earnings of the 100 miles formerly subsidized by the United States.

I inclose a memorandum which contains a synopsis of the history of the Central Branch, which, while I have not verified myself, I presume is substantially correct.

Very truly, yours,

JOHN F. DILLON.

THE CENTRAL BRANCH RAILWAY CO.

The Atchison & Pikes Peak Railroad Co. was incorporated February 11, 1859, and constructed a line of road from Atchison to Waterville, Kans., which was opened for business on January 20, 1868. The name of this corporation was changed to Central Branch Union Pacific Railroad Co. on January 1, 1867.

Under decree of the circuit court of the United States, entered in the month of February, 1898, in the suit of Samuel Carr and Oaks A. Ames, trustees, v. Central Branch Union Pacific Railroad Co. et al., the property of that company was sold to Simon Borg, of New York City, and Gilbert Clapp, of Boston.

The road was purchased from Messrs. Borg and Clapp by the Central Branch Union Pacific Railway Co., which was organized for that purpose by articles of association, filed in the office of secretary of state of Kansas, on June 29, 1898.

Subsequently the Central Branch Union Pacific Railway Co., the Atchison, Colorado & Pacific Railroad Co. (owning property extending from Waterville to Lenora, Greenleaf to Washington, Yuma to Warwick, and Downs to Alton, Kans.) and the Atchison, Jewell County & Western Railroad Co. (owning a line of road commencing at Jamestown and terminating at Burr Oak, Kans.) entered into articles of agreement and consolidation, forming the Central Branch Railway Co., which were filed with the secretary of state of Kansas, on July 8, 1899; the Atchison, Colorado & Pacific, and the Atchison, Jewell County & Western Railroads having been formerly leased by the Central Branch Union Pacific Railroad Co.

N.

DEPARTMENT OF JUSTICE,
OFFICE OF THE UNITED STATES ATTORNEY
FOR THE SOUTHERN DISTRICT OF NEW YORK,
New York, May 19, 1911.

HON. WILLIAM T. THOMPSON,
Solicitor of the Treasury, Washington,, D. C.

SIR: I inclose herewith a copy of a letter I have received from John F. Dillon concerning the Central Branch of the Union Pacific Railroad Co.

Respectfully,

HENRY A. WISE,
United States Attorney.

O.

DEPARTMENT OF JUSTICE,
OFFICE OF THE UNITED STATES ATTORNEY
FOR THE SOUTHERN DISTRICT OF NEW YORK,
New York, May 20, 1911.

W. T. THOMPSON, Esq.,
Solicitor of the Treasury, Washington, D. C.

SIR: I inclose herewith copy of a letter received this morning from John F. Dillon, Esq., with inclosure referred to therein.

Trusting this will be of assistance to you, I am,

Respectfully,

HENRY A. WISE,
United States Attorney.

P.

DEPARTMENT OF JUSTICE,
OFFICE OF THE SOLICITOR OF THE TREASURY,
Washington, D. C., June 12, 1911.

The SECRETARY OF THE INTERIOR.

SIR: Will you please furnish me at your earliest convenience a report of the net earnings of the Central Branch Union Pacific Railroad Co., the same being 100 miles of railroad extending from Atchison to Waterville, Kans., for the years 1903 to 1910, inclusive?

At the request of the Secretary of the Treasury I am investigating the status of the claim of the United States against said 100 miles of railroad, growing out of subsidy bonds issued and paid by the Government to aid in the construction of said line, and the information requested is material to such investigation.

Very respectfully,

W. T. THOMPSON, *Solicitor*.

Q.

STATE OF KANSAS,
OFFICE OF PUBLIC UTILITIES COMMISSION,
Topeka, June 15, 1911.

Mr. W. S. THOMPSON,
Solicitor of the Treasury, Washington, D. C.

DEAR SIR: Your letter of June 3, requesting certain information regarding the Central Branch Railway, has been received, and I take pleasure in inclosing herewith a statement showing the operating revenue, the operating expenses, and the net operating revenue of this line of railway for the years 1902-1904, 1906, 1907, 1908, and 1909.

There was no railroad commission in Kansas from 1899 to 1901, and consequently no reports were required. I am unable to find reports for the years 1903-1905. In 1909 the Central Branch Railway was merged in the Missouri Pacific system, and the report for the year 1910 is for the Missouri Pacific system as a whole, and I am unable to give you the earnings of the Central Branch proper.

You refer to the Central Branch as the line extending from Atchison to Waterville, a distance of 100 miles. The reports to the commission are for the Central Branch, extending from Atchison to Lenora, Kans., a distance of 293.39 miles; Greenleaf to Washington, Kans., 7 miles; Yuma and Warwick, 30.80 miles; Jamestown to Burr Oak, 33.40 miles, and Downs to Alton, 23.60 miles. The reports show the earnings, expenses, and net operating revenue for the entire Central Branch, and it would not be possible to segregate that portion of the line between Atchison and Waterville.

Trusting that this information will be satisfactory, I am,

Yours, very truly,

E. H. HOGUELAND, *Secretary*.

[State of Kansas, office of the Public Utilities Commission, Topeka.]

	Operating revenue.	Operating expenses.	Net operating revenue.
1909.....			
1901.....			
1902.....	\$1,195,441.71	\$384,818.03	\$310,623.68
1903.....			
1904.....	1,778,992.57	967,901.09	791,091.48
1905.....			
1906.....	1,884,325.96	1,063,204.54	801,121.42
1907.....	1,633,834.06	1,063,051.08	550,782.98
1908.....	1,498,798.07	909,597.57	529,200.50
1909.....	1,674,770.08	1,202,890.41	471,880.27

R.

DEPARTMENT OF THE INTERIOR,
Washington, June 17, 1911.

The SOLICITOR OF THE TREASURY.

SIR: In reply to your letter of June 12, 1911, requesting a report of the net earnings of the Central Branch of the Union Pacific Railroad Co. for the years 1903 to 1910, inclusive, I have the honor to advise you that the information desired can not be furnished from the records of this department. I understand, however, that the Interstate Commerce Commission is able to furnish the desired information.

Very respectfully,

SAMUEL ADAMS,
First Assistant Secretary.

S.

DEPARTMENT OF JUSTICE,
OFFICE OF THE SOLICITOR OF THE TREASURY,
Washington, D. C., June 20, 1911.

The SECRETARY OF THE INTERIOR.

SIR: I beg to acknowledge the receipt of the letter of the First Assistant Secretary of the Interior of the 17th instant, stating that the information requested in my letter of the 12th instant touching the financial transactions, including the gross and net earnings, of a line of railroad extending from Atchison to Waterville, Kans., originally known as the Central Branch Union Pacific Railroad Co., can not be furnished from the records of your department, and suggesting that the Interstate Commerce Commission would be able to furnish the information desired.

I regret to say that upon application to the Interstate Commerce Commission for the information they replied that they were unable to furnish the same.

In connection with this matter permit me to call your attention to the act of June 19, 1878, creating the office of auditor of railroad accounts, and defining the duties thereof; the act of March 3, 1881 (21 Stat., 409), changing the name of auditor of railroad accounts

to commissioner of railroads; and the act of March 3, 1903 (22 Stat., 1119), terminating the office of commissioner of railroads and transferring to the Secretary of the Interior the duties of said officer, and the records and files of said office.

Under these statutes it would seem to be the duty of the present owner of the line of railway above mentioned to continue to make reports to your office touching the gross and net earnings of said railroad; as it would seem to also be the duty of said railway to account to the United States for 5 per cent of the net earnings thereof on account of the bonds which were issued and paid by the United States in aid of the construction of the same.

In this connection permit me to inquire whether any demand has been made upon the present owner, or its predecessor in title and ownership, of this road for the reports called for by the act of June 19, 1878, since the transfer of the duties of the commissioner of railroads to your department by the act of March 3, 1903. If no demand has been made for such reports, could you suggest any reason why they may not now be demanded? It is possible that I have overlooked some statute or other reason relieving the railroad company from making these reports. If so, I would be glad to have it pointed out.

Thanking you in advance for any information you may be able to furnish me along the line suggested, I am,

Yours, respectfully,

W. T. THOMPSON, *Solicitor*.

T.

DEPARTMENT OF THE INTERIOR,
Washington, July 29, 1911.

The SOLICITOR OF THE TREASURY.

SIR: Referring to your letter of June 20, 1911, and previous correspondence, relative to certain reports which were by law required to be submitted by the Central Branch Union Pacific Railroad Co. to the commissioner of railroads, I beg to advise you that upon investigation it has been found that on February 9, 1905, an Executive order was signed directing that the duties pertaining to the office of the commissioner of railroads and then devolving upon the Secretary of the Interior by virtue of the act of March 3, 1903 (32 Stat., 1119), together with all records and files of said office, be transferred to the Department of Commerce and Labor, such transfer to be effected the 1st day of March, 1905.

It has been further found, however, that by Executive order of March 31, 1905, the order of February 9 preceding was annulled, no reason being assigned for the same.

I have also ascertained that inasmuch as no special appropriation was made for the performance of the duties formerly pertaining to the office of the commissioner of railroads, the duties were not in fact performed and the railroad companies have not submitted the reports which it appears under the law they were required to submit.

I will state further for your information that an order has been issued assigning the duties of the office of the commissioner of railroads to the chief clerk of this department, who has also been directed

to ascertain what reports should have been submitted by the various railroad companies and to make the necessary effort to secure such reports as have not been supplied. Upon the receipt of the information, if, indeed, it can be secured, I shall be pleased to furnish you with such data as you desire.

Very respectfully,

WALTER L. FISHER,
Secretary.

ORDER.

JULY 29, 1911.

It is hereby directed that the duties formerly devolving upon the commissioner of railroads, under the acts of June 19, 1878 (20 Stat., 169), and March 3, 1881 (21 Stat., 409), and the records and files relating thereto, which were, by the act of March 3, 1903 (32 Stat., 1119), transferred to the Secretary of the Interior, be assigned to the office of the chief clerk of the department, who is hereby authorized and directed to ascertain to what extent the duties of the office were performed by the department subsequent to their transfer to the Secretary of the Interior.

It is further directed that if it be found that the reports required of the various railroad companies to be submitted to the commissioner of railroads have not been furnished since that office was abolished, prompt action be taken to secure such reports as should have been submitted.

Upon securing the information herein provided for, the chief clerk will submit a report to the Secretary as to the result of the action taken by him, upon which the advisability of requesting the President to issue an order transferring the duties to the Department of Commerce and Labor under the authority of the act of February 14, 1903 (32 Stat., 825, 830), will be considered.

WALTER L. FISHER,
Secretary.

U.

AUGUST 5, 1911.

Hon. W. T. THOMPSON,
Solicitor of the Treasury.

MY DEAR SIR: I have to acknowledge the receipt of your letter of the 28th ultimo, transmitting your report on the present status of the claim of the United States on account of the subsidy bonds issued and paid by the United States as aid in the construction of the Central Branch Union Pacific Railroad Co.

Very truly, yours,

FRANKLIN MACVEAGH,
Secretary

V.

DEPARTMENT OF THE INTERIOR,
Washington, June 19, 1912.

The ATTORNEY GENERAL.

SIR: Your attention is invited to the act of June 19, 1878 (20 Stats., 169), creating the office of auditor of railroad accounts in this department.

By the act of March 3, 1887 (21 Stats., 409), the title of the position was changed to commissioner of railroads, and by the act of March 3, 1903 (32 Stats., 1119), the office of commissioner of railroads was abolished and the duties required to be performed by the act of June 19, 1878, devolved on the Secretary of the Interior.

The railroads coming within the purview of the act of 1878 were not called on for annual reports from the close of the fiscal year 1903 until about September 23, 1911, when they were requested to make annual report, as required by said act, for the fiscal years ended June 30, 1904, to June 30, 1910, inclusive, and on November 1, 1911, make a report for the fiscal year ended June 30, 1911.

These railroads were called on for said reports because of a letter from the Solicitor of the Treasury to this department, dated June 12, 1911, requesting a report of the net earnings of the Central Branch Missouri Pacific Railroad Co. for that part of the road extending from Atchison, Kans., to Waterville, Kans., for years 1903 to 1910, inclusive. A copy of this letter is inclosed, as are also copies of subsequent correspondence between the Solicitor of the Treasury and this department. There are likewise inclosed copies of the correspondence between different officers of the Missouri Pacific Railroad Co. and the department.

The company has failed to comply with the request of this department to furnish reports for the fiscal years ended June 30, 1904, to June 30, 1911, inclusive, as requested, and copies of the correspondence are referred to you for such action, if any, as you may consider proper in the premises.

Very respectfully,

CLEMENT S. UCKER,
Chief Clerk and Chief Executive Officer.

W.

DEPARTMENT OF THE INTERIOR,
Washington, June 22, 1912.

THE SOLICITOR OF THE TREASURY.

SIR: Referring to your letter of June 12, 1911, requesting a report of the net earnings of the Central Branch Missouri Pacific Railroad Co. for that part of the railroad extending from Atchison, Kans., to Waterville, Kans., for the fiscal years 1903 to 1910, inclusive, there is inclosed for your information a copy of department letter of June 19, 1912, to the Attorney General, advising him of the steps that have been taken by this department since the date of your letter and of the neglect of the Central Branch Missouri Pacific Railroad Co. to comply with the requests of this department.

Very respectfully,

CLEMENT S. UCKER,
Chief Clerk and Chief Executive Officer.

X.

MEMORANDUM FOR THE SECRETARY OF THE SECRETARY.

DEPARTMENT OF JUSTICE,
OFFICE OF THE SOLICITOR OF THE TREASURY,
Washington, D. C., March 22, 1912.

My report on the claim of the United States against the Central Branch Union Pacific Railroad Co. was handed to me by Mr. Kiely, with the request that I indicate to whom the report should now be referred by you.

In view of the provisions of section 4 of the act of March 3, 1887, which are set out on page 52 of my report, I would advise that it be referred to the President of the United States for such action as he may direct to be taken by the Attorney General.

The report is herewith returned.

W. T. THOMPSON, *Solicitor.*

Y.

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, March 23, 1912.

SIR: Some time ago I requested the Solicitor of the Treasury to investigate and report as to the advisability of taking action looking to the recovery of the claim of the United States for \$1,600,000 and accrued interest against the Central Branch Union Pacific Railroad, consisting of 100 miles of railway extending from Atchison to Waterville, Kans., on account of a subsidy loan in the form of Government bonds issued and paid by the United States to aid in the construction thereof.

The investigation and report have been made, and as it appears from section 4 of the act of Congress approved March 3, 1887, quoted at page 52 of the solicitor's report, that it is now a proper matter for the consideration of the President, I am transmitting herewith the report of the solicitor above referred to for your consideration and such direction as to you may seem proper to be given in the premises.

I am, very respectfully,

FRANKLIN MACVEAGH,
Secretary.

The PRESIDENT.

○

LETTER FROM THE
INTERSTATE COMMERCE COMMISSION

SUBMITTING

REPORT OF INVESTIGATION

IN THE MATTER OF

THE RELATION OF COMMON CARRIERS
SUBJECT TO THE ACT TO REGULATE
COMMERCE TO COAL AND OIL AND
THE TRANSPORTATION THEREOF



JULY 20, 1914.—Referred to the Committee on Interstate and Foreign Commerce
and ordered to be printed

WASHINGTON
GOVERNMENT PRINTING OFFICE

1914

THE INTERSTATE COMMERCE COMMISSION.

JAMES S. HARLAN, of Illinois.

JUDSON C. CLEMENTS, of Georgia.

EDGAR E. CLARK, of Iowa.

CHARLES C. McCHORD, of Kentucky.

BALTHASAR H. MEYER, of Wisconsin.

HENRY C. HALL, of Colorado.

WINTHROP M. DANIELS, of New Jersey.

GEORGE B. McGINTY, Secretary.

II

LETTER OF SUBMITTAL.

INTERSTATE COMMERCE COMMISSION,
Washington, D. C., June 9, 1914.

To the President of the Senate and the Speaker of the House of Representatives of the United States:

SIRS: I have the honor to submit the following report of the Interstate Commerce Commission responsive to the joint resolution of the Senate and House of Representatives, a copy of which precedes the report. The Commission has heretofore submitted reports under this resolution in connection with its investigations in various fields throughout the country. The report submitted herewith has particular reference to coal and coal roads in the State of Illinois and incidentally to roads extending into adjacent Indiana coal fields.

Respectfully submitted.

JAMES S. HARLAN,
Chairman.

III

COAL AND OIL RESOLUTIONS.

JOINT RESOLUTION Instructing the Interstate Commerce Commission to make examinations into the subject of railroad discriminations and monopolies in coal and oil, and report on the same from time to time.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Interstate Commerce Commission be, and is hereby, authorized and instructed immediately to inquire, investigate, and report to Congress, or to the President when Congress is not in session, from time to time as the investigation proceeds—

First. Whether any common carriers by railroad, subject to the interstate-commerce act, or either of them, own or have any interest in, by means of stock ownership in other corporations or otherwise, any of the coal or oil which they, or either of them, directly or through other companies which they control or in which they have an interest, carry over their or any of their lines as common carriers, or in any manner own, control, or have any interest in coal lands or properties or oil lands or properties.

Second. Whether the officers of any of the carrier companies aforesaid, or any of them, or any person or persons charged with the duty of distributing cars or furnishing facilities to shippers, are interested, either directly or indirectly, by means of stock ownership or otherwise, in corporations or companies owning, operating, leasing, or otherwise interested in any coal mines, coal properties, or coal traffic, oil, oil properties, or oil traffic over the railroads with which they or any of them are connected or by which they or any of them are employed.

Third. Whether there is any contract, combination in the form of trust, or otherwise, or conspiracy in restraint of trade or commerce among the several States, in which any common carrier engaged in the transportation of coal or oil is interested, or to which it is a party; and whether any such common carrier monopolizes or attempts to monopolize, or combines or conspires with any other carrier, company or companies, person or persons to monopolize any part of the trade or commerce in coal or oil, or traffic therein among the several States or with foreign nations, and whether or not, and if so, to what extent, such carriers, or any of them, limit or control, directly or indirectly, the output of coal mines or the price of coal and oil fields or the price of oil.

Fourth. If the Interstate Commerce Commission shall find that the facts or any of them set forth in the three paragraphs above do exist, then that it be further required to report as to the effect of such relationship, ownership, or interest in coal or coal properties and coal traffic, or oil, oil properties, or oil traffic aforesaid, or such contracts or combinations in form of trust or otherwise, or conspiracy or such monopoly or attempt to monopolize or combine or conspire as aforesaid, upon such person or persons as may be engaged independently of any other persons in mining coal or producing oil and shipping the same, or other products, who may desire to so engage, or upon the general public as consumers of such coal or oil.

Fifth. That said Commission be also required to investigate and report the system of car supply and distribution in effect upon the several railway lines engaged in the transportation of coal or oil as aforesaid, and whether said systems are fair and equitable, and whether the same are carried out fairly

and properly; and whether said carriers, or any of them, discriminate against shippers or parties wishing to become shippers over their several lines, either in the matter of distribution of cars or in furnishing facilities or instrumentalities connected with receiving, forwarding, or carrying coal or oil as aforesaid.

Sixth. That said Commission be also required to report as to what remedy it can suggest to cure the evils above set forth, if they exist.

Seventh. That said Commission be also required to report any facts or conclusions which it may think pertinent to the general inquiry above set forth.

Eighth. That said Commission be required to make this investigation at its earliest possible convenience and to furnish the information above required from time to time and as soon as it can be done consistent with the performance of its public duty.

Public Resolution No. 8, approved March 7, 1906.

JOINT RESOLUTION Amending joint resolution instructing the Interstate Commerce Commission to make examinations into the subject of railroad discriminations and monopolies, and report on the same from time to time, approved March seventh, nineteen hundred and six.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That joint resolution instructing the Interstate Commerce Commission to make examinations into the subject of railroad discriminations and monopolies, and report on the same from time to time, approved March seventh, nineteen hundred and six, is hereby amended by adding the following thereto:

Ninth. To enable the Commission to perform the duties required and accomplish the purposes declared herein, the Commission shall have and exercise under this joint resolution the same power and authority to administer oaths, to subpoena and compel the attendance and testimony of witnesses and the production of documentary evidence, and to obtain full information, which said Commission now has under the act to regulate commerce, approved February fourth, eighteen hundred and eighty-seven, and acts amendatory thereof or supplementary thereto now in force or may have under any like statute taking effect hereafter. All the requirements, obligations, liabilities, and immunities imposed or conferred by said act to regulate commerce and by "An act in relation to testimony before the Interstate Commerce Commission in cases under or connected with an act entitled 'An act to regulate commerce,' approved February fourth, eighteen hundred and eighty-seven, and amendments thereto," approved February eleventh, eighteen hundred and ninety-three, shall also apply to all persons who may be subpoenaed to testify as witnesses or to produce documentary evidence in pursuance of the authority herein conferred.

Public Resolution No. 11, approved March 21, 1906.

CONTENTS.

	Page.
Letter of submittal.....	III
Joint resolution of Senate and House of Representatives.....	v
Report of Commission.....	1-49
Illinois coal basin—general facts.....	1-3
Interest of carriers in coal companies—clause First (a).....	3-11
Interest of carriers in coal properties—clause First (b).....	11-13
Interest of carriers' officials in coal companies—clause Second.....	14-17
Contracts and monopolies—clause Third.....	18-19
Effect of relations of carriers with coal companies—Industrial Railways— clause Fourth.....	20-25
Car distribution—clause Fifth.....	25-32
Recommendations and conclusions—clauses Sixth and Seventh	32
Appendix:	
New York Central lines.....	33-49
Harrisburg coal district.....	33
Big Four coal lands.....	34
Saline County Coal Company.....	36
O'Gara Coal Company.....	39
Concessions to O'Gara Coal Company.....	42-47
Indebtedness of O'Gara Coal Company.....	42
Advances by New York Central lines to O'Gara Coal Company.....	42
Prepayment of fuel coal bought of O'Gara Coal Company.....	43
Extensions of credit on freight charges.....	43
Protection of O'Gara contracts by carrier.....	44
Solicitation of business for O'Gara by railroad officials.....	44
Additional price paid for storage coal.....	44
Prices paid by carriers for fuel coal.....	45
Use of false point of origin on Big Four billing.....	45
Unlawful application of divisions of through rates.....	45
Rebate of \$60,000 to O'Gara Coal Company.....	46
Tentative plans of consolidation.....	48
Comments.....	47
Carriers:	
Atchison, Topeka & Santa Fe Railway Company.....	3, 27
Baltimore & Ohio Southwestern Railway Company.....	16, 31
Chicago, Burlington & Quincy Railroad Company.....	13, 30
Cleveland, Cincinnati, Chicago & St. Louis Railway Company (Big Four).....	9, 13, 17, 29, 33, 42, 43, 48
Chicago, Indianapolis & Louisville Railway Company.....	4, 27
Chicago, Indiana & Southern Railroad Company.....	34, 44
Chicago Junction Railway Company.....	15
Chicago, Lake Shore & Eastern Railway Company.....	18
Chicago, Milwaukee & St. Paul Railway Company.....	6, 28
Chicago, Peoria & St. Louis Railway Company.....	31
Chicago, Rock Island & Pacific Railway Company.....	7, 29

Carriers—Continued.

	Page
Chicago, Terre Haute & Southeastern Railway Company.....	27
Chicago, Zeigler & Gulf Railroad Company.....	24
Chicago & Alton Railroad Company.....	10, 30
Chicago & Eastern Illinois Railroad Company.....	8, 11, 18, 29
Chicago & Illinois Midland Railroad Company.....	24
Chicago & North Western Railway Company.....	4, 27
East St. Louis & Suburban Railway Company.....	32
Elgin, Joliet & Eastern Railway Company.....	18, 29, 31
Grand Trunk Western Railway Company.....	45
Illinois Central Railroad Company.....	7, 28
Illinois Traction Company.....	9
Lake Shore & Michigan Southern Railway Company.....	13, 42, 43, 46
Litchfield & Madison Railway Company.....	23, 31
Louisville & Nashville Railroad Company.....	32
Macoupin County Railway Company.....	4
Minneapolis & St. Louis Railway Company.....	32
Missouri Pacific Railway Company.....	5, 16, 27
New York Central lines.....	9, 13, 15, 33-49
Pennsylvania Company.....	9
St. Louis, Iron Mountain & Southern Railway Company.....	5, 16, 27
St. Louis, Peoria & North Western Railway Company.....	4
St. Louis, Troy & Eastern Railway Company.....	21
St. Louis & O'Fallon Railway Company.....	23
Southern Railway Company.....	16, 31
Springfield Terminal Railroad Company.....	24
St. Louis & Belleville Electric Railway Company.....	32
Toledo, Peoria & Western Railway Company.....	31
Toledo, St. Louis & Western Railway Company.....	14, 22
Union Pacific Railroad Company.....	10
Vandalia Railroad Company.....	9, 29
Wabash Railroad Company.....	15, 30
Coal and other companies:	
Bell & Zoller Coal Company.....	25
Berry (B. F.) Coal Company.....	6
Bickett Coal & Coke Company.....	14
Big Muddy Coal & Iron Company.....	6, 15, 16
Braceville Coal Company.....	6
Brazil Block Coal Company.....	8
Breese Trenton Mining Company.....	16
Bunsen Coal Company.....	18
Burnwell Coal Company.....	11
Chicago & Harrisburg Coal Company.....	9, 48
Chicago & Indianapolis Coal Company.....	4
Clover Leaf Coal Mining Company.....	14
Coal Valley Mining Company.....	7
Commonwealth Edison Company.....	24
Consolidated Coal Company of St. Louis.....	6, 15
Consolidated Indiana Coal Company.....	7
Danville Consumers Coal Company.....	9
Davenport Coal Company.....	35, 36
Daring (J. K.) Coal Company.....	8, 12
Devoy & Kuhn Coal & Coke Company.....	22
Donk Brothers Coal & Coke Company.....	21

Coal and other companies—Continued.

	Page.
Federal Steel Company.....	18
Granite Improvement Company.....	9
Grant Coal Mining Company.....	15
Harrisburg Big Muddy Coal Company.....	42
Harrisburg Southern Coal Company.....	17
Illinois Midland Coal Company.....	24
Illinois Securities Company.....	9
Illinois Union Coal Company.....	11
Jones & Adams Coal Company.....	24
Kerns-Donewald Coal Company.....	9
Kortkamp Coal Company.....	11
Lumaghi Coal Company.....	9
Madison Coal Corporation.....	7
Merchants' & Manufacturers' Investment Company.....	21
Mississippi Valley Corporation.....	7
Monon Coal Company.....	4
Montgomery County Coal Company.....	12
Mount Olive & Staunton Coal Company.....	23
Oak Hill Coal & Mining Company.....	11
O'Gara Coal Company.....	16, 33, 36, 39-47, 48
Peabody Coal Company.....	11, 24
St. Louis & O'Fallon Coal Company.....	23
St. Paul Coal Company.....	6
Saline County Coal Company.....	9, 13, 16, 36, 47, 48
Shoal Creek Coal Company.....	14
Southern Coal & Mining Company.....	16
Superior Coal Company.....	4
Toluca Coal Company.....	3
Union Fuel Company.....	6, 15
Union Pacific Coal Company.....	11
United States Steel Corporation.....	18
Vandalia Mineral Company.....	9
Western Anthracite Coal & Coke Company.....	23
Western Coal & Mining Company.....	5, 15
West Jackson Hill Coal Mining & Transport Company.....	8, 11
Woolley, J., Coal Company.....	12
Zeigler Coal Company.....	24
Individuals:	
Bower, W. C.....	40
Brown, W. C.....	16, 34-36, 36-39, 39-41, 44, 47, 49
Busse, Fred A.....	17
Byrd, A. R., & Sons.....	12
Carstensen, John.....	33, 40-41, 42, 44, 46, 47, 48
Daly, C. F.....	40
Deems, J. F.....	40
Dering, J. K.....	12
Fitzgerald, R.....	15
Garrison, O. L.....	16
Glennon, E. T.....	40
Gould Family.....	15
Grammar, G. F.....	40
Henson, E. T.....	40
Hewett, C. P.....	34-37

Individuals—Continued.

	Page.
Hubbard, Thomas.....	14
Huddleston, R. M.....	46, 48
Kerr, James.....	89, 41
Kramer, E. C.....	16
Leiter, Joseph.....	24
Leiter, L. Z., estate.....	25
Linn, A. L., jr.....	41
McCune, S. W.....	34-37
O'Gara, T. J.....	17, 33, 38, 40, 41
Peabody, Francis S.....	24
Pierce, C. I.....	37
Ross, George H.....	14
Russell, J. B.....	39
Sage, Olivia H.....	15
Sage, Russell, estate.....	15
Schaff, C. E.....	34, 36, 40
Slocum, J. J.....	15

No. 860.

IN THE MATTER OF THE RELATION OF COMMON
CARRIERS SUBJECT TO THE ACT TO REGULATE
COMMERCE TO COAL AND OIL AND THE TRANSPORTATION
THEREOF.

June 9, 1914.

The relations of trunk lines and their officials to coal operations in the state of Illinois and incidentally in the state of Indiana, described, pursuant to the so-called Tillman-Gillespie resolution.

REPORT OF THE COMMISSION TO THE SENATE AND HOUSE OF REPRESENTATIVES OF THE UNITED STATES.

BY THE COMMISSION:

Much of the information contained herein was gathered considerably over a year ago, but the submission of the report has been delayed owing to the difficulty experienced by the Commission, as explained more fully in the appendix to the report, in securing the facts pertaining to the interests of the New York Central system and its officials in Illinois coal properties.

Illinois is said to contain the largest area of bituminous coal within any single state. This coal area, estimated to be over 37,000 square miles in extent, underlies 85 of the 102 counties. The parts of the state having no coal deposits are the northern one-fifth, a narrow strip bordering the Mississippi River, and a few small counties in the southern part.

The Illinois coal region comprises about three-fourths of what is known as the Eastern Interior Field, the remainder lying in adjacent parts of Indiana and Kentucky. This coal-bearing area is shaped somewhat like a basin or bowl of a spoon, its greatest length lying southeasterly across the state from between Rock Island and La Salle to beyond the Wabash and Ohio rivers. Coal comes toward the surface around the edges of the basin and in a general way dips toward the center from all sides. The large producing fields are to a great extent along the outer side of the basin where coal is most easily reached. Since in the lowest areas the thick coal beds lie 1,200 feet or more below the surface, they probably will not be utilized for some time to come. While the original amount of coal

underlying the state of Illinois is variously estimated to have been from 140 to 240 billion tons, and calculations show that less than 1 per cent has been exhausted, the remaining coal is not all available for mining under present conditions; in fact, coal from the thinner and deeper seams will always be at a disadvantage as long as it has to compete with more cheaply mined coal from this and other fields.

Illinois is the second largest coal-producing state. The following statistics will serve to show the extent of its output during the year ending June 30, 1912:

Number of counties producing coal.....	52
Number of counties producing for shipment over 500,000 tons each.....	21
Number of mines of all kinds (local and shipping).....	879
Number of shipping or commercial mines.....	380
Output of all mines, tons.....	57, 500, 000
Output of shipping mines, tons.....	56, 000, 000
Total tons shipped.....	51, 500, 000
Disposed of locally by shipping mines (including locomotive chute coal), tons.....	4, 500, 000
Output of shipping mines in 21 counties, tons.....	53, 000, 000

Aside from railroad fuel and coal sold at points near the mines, most of the Illinois coal is marketed in St. Louis, Chicago, and points located in the north, northwest, and west.

Up to about 15 years ago, the coal deposits underlying land in the Illinois coal basin very largely belonged to the owners of the land. At the present time the larger part of the most available coal near the margin of the basin is owned by mining, railroad, and industrial companies. Several of the large railroads have acquired from 20,000 to 40,000 acres each of this coal as a reserve to protect future traffic and fuel requirements. A number of Illinois railroads have direct or associated financial interest in mining companies which produce locomotive fuel and also compete with independent operators in the production and selling of commercial coal.

The demand for coal fluctuates between summer and winter to such an extent that the output of Illinois mines can not be uniform throughout the year. Illinois coal can not be mined in the summer and stored for use in the winter because it contains such a percentage of moisture that the lumps crumble and slack when exposed to the elements for a month or more. It must be mined substantially as it is consumed, and consequently the production is much less in the months from April to September than in the other months of the year. A sufficient capacity must be maintained to meet the full requirements of the winter season; but because of the tendency of the coal to slack when exposed, the mines can not be operated to their full capacity during the summer season. When the annual running

time of mines falls below three-quarters full time, as it has for several years past, the annual average cost per ton increases excessively, owing to the fact that administrative expenses, taxes, interest, and other fixed charges are as great when the mines are closed down as when they are operating to full capacity. On this account the fear of idle time causes keen competition among mine operators for contracts with railroads and with industries which use large quantities of coal during the summer as well as the winter months. The result of this competition is that operators often contract to furnish coal at prices no higher than the cost of production, and sometimes, it is said, at less. In such cases they depend for their profit on the increased commercial demands and higher prices prevailing during the winter season. That the need of operators to secure railroad contracts, even though unremunerative, to tide them over the summer months makes an incentive for a carrier unduly to favor mining companies associated with it, is indicated in another part of this report.

The results in detail of the investigation are reported under the several clauses of the resolution. It should be understood that the facts related herein are those existent at the time of the Commission's investigation.

FIRST (a). WHETHER ANY COMMON CARRIERS BY RAILROAD, SUBJECT TO THE INTERSTATE-COMMERCE ACT, OR EITHER OF THEM, OWN OR HAVE ANY INTEREST IN, BY MEANS OF STOCK OWNERSHIP IN OTHER CORPORATIONS OR OTHERWISE, ANY OF THE COAL OR OIL WHICH THEY, OR EITHER OF THEM, DIRECTLY OR THROUGH OTHER COMPANIES WHICH THEY CONTROL OR IN WHICH THEY HAVE ANY INTEREST, CARRY OVER THEIR OR ANY OF THEIR LINES AS COMMON CARRIERS, * * *.

Atchison, Topeka & Santa Fe Railway Company.—The Atchison, Topeka & Santa Fe Railway Company owns all the outstanding bonds (\$389,000) of the Toluca Coal Company. The capital stock of the coal company (\$500,000) is held in the names of three individuals, and apparently neither the carrier nor any of its officials are interested therein.

The coal company owns about 12,000 acres of coal lands in Marshall county in the state of Illinois, and operates one mine near Toluca, with a daily capacity of about 1,500 tons. It is served by the Atchison, Topeka & Santa Fe Railway and the Chicago & Alton Railroad. During the year ending June 30, 1912, this mine produced 257,473 tons of coal, of which about 71 per cent was sold to the Santa Fe and $\frac{1}{4}$ of 1 per cent to the Alton; $19\frac{1}{2}$ per cent was sold and shipped commercially, and the remainder, 9 per cent, disposed of locally. Of

the commercial shipments, 29 per cent moved over the Santa Fe and 71 per cent over the Alton.

Chicago & North Western Railway Company.—The Chicago & North Western Railway Company owns the entire capital stock of the Superior Coal Company (\$2,000,000) and of the Macoupin County Railway Company (\$10,000). Neither of these subsidiary companies has any bonded indebtedness.

The Superior Coal Company owns about 45,000 acres of coal lands in Macoupin county, in the state of Illinois, upon which it operates three mines served by the Macoupin County Railway. These were opened in 1904 for the purpose of furnishing fuel coal for use of the North Western line; and they produce about 2,000,000 tons of coal per year, of which between 90 and 95 per cent is sold to the North Western line, the balance consisting largely of screenings being sold commercially, principally in Chicago.

The Chicago & North Western has no track connection with the Macoupin County Railway but is now building a line from Peoria to a junction with it near Girard. The new line will be known as the St. Louis, Peoria & North Western Railway and will serve six independent mines when opened up.

The assertion has been made that the low price at which the Superior Coal Company, by virtue of its association with the carrier, sells screenings in the commercial market, is detrimental to its competitors.

Chicago, Indianapolis & Louisville Railway Company.—The Chicago, Indianapolis & Louisville Railway Company owns \$299,500 of the capital stock of the Chicago & Indianapolis Coal Company, being the entire amount outstanding except directors' shares. The coal company has no bonded indebtedness. It owns about 3,400 acres of coal lands and one mine in Sullivan county in the state of Indiana, both being leased on a royalty basis to the Monon Coal Company.

The Monon Coal Company was formed by certain bankers in 1911, at the solicitation of the president of the railway company, for the purpose of developing coal properties along the line of the Chicago, Indianapolis & Louisville Railway. The Monon Coal Company has issued stock to the amount of \$1,000,000, and has outstanding bonds to the amount of \$2,750,000. The railway company owns 25 per cent of the stock which was acquired under the organization plan and is carried on its books at a nominal value. No dividends have yet been paid on this stock. The remaining 75 per cent of the stock and all the bonds are owned, it is said, by persons not associated in any way with the railway company. The Chicago, Indianapolis & Louisville Railway Company guarantees the interest on the bonds of the coal company.

In addition to the mine of the Chicago & Indianapolis Coal Company (known as the "Andromeda"), the Monon Coal Company has acquired five other mines on the carrier's lines, three of which are owned and two leased. It also owns three mines on other railroads in Indiana.

The carrier purchases all its fuel coal (at present amounting to 1,500 tons per day) from the Monon Coal Company, including the entire output of the "Andromeda" mine (about 600 tons). The output of the mines of the Monon Coal Company on the lines of this carrier amounts potentially to about 6,000 tons per day. This product, other than that taken by the railway company, is sold largely to industries located on its rails, and it is the plan to control as much of this commercial business as possible; the remainder, and the product of the Monon mines on the rails of other carriers is sold in Chicago and the north and northwest.

The royalties received by the Chicago & Indianapolis Coal Company for the lease of its property to the Monon Coal Company are not disbursed in dividends to the parent railway company, but are put back into the property in the form of improvements. In addition, advances bearing no interest have been made by the railway company to the Chicago & Indianapolis Coal Company for the improvement of the property. The carrier also makes loans to the Monon Coal Company, upon which 8 per cent interest is charged, for the purpose of providing that company with working capital, the other stockholders of the coal company contributing an equal proportion. To this end, the railway company has advanced \$100,000, now represented by a note of the coal company, indorsed by the railway company, which was discounted, and is held by a banking house in New York; the other stockholders have made similar advances to the amount of \$300,000.

Missouri Pacific Railway Company and St. Louis, Iron Mountain & Southern Railway Company.—The Missouri Pacific Railway Company controls the St. Louis, Iron Mountain & Southern Railway Company through ownership of practically all its capital stock. The Missouri Pacific owns all the capital stock (\$1,000,000) and the Iron Mountain owns all the outstanding bonds (\$1,000,000) of the Western Coal & Mining Company. The carriers' fuel agent is vice president and general manager of the coal company.

The Western Coal & Mining Company operates mines along the lines of these carriers in Illinois, Missouri, Kansas, and Arkansas, and on the lines of other carriers in Oklahoma. It has one mine at Bush, Williamson county, in the state of Illinois, with a daily capacity of about 1,600 tons, and owns in Illinois about 9,500 acres of coal lands and mineral rights in Williamson, Franklin, and Jackson counties. A statement of the production of the Bush mine

and the percentage sold to the Missouri Pacific and Iron Mountain companies follows:

Year ending June 30.	1910	1911	1912
Tons of lump and mine run produced for shipment.....	141,621	208,296	294,413
Percentage of lump and mine run sold to the carriers; balance commercially, per cent.....	78.66	97.83	98.19
Tons of screenings sold commercially.....	31,514	26,778	22,629

Coal sold commercially is shipped principally to points along the lines of the Missouri Pacific and Iron Mountain roads.

The carriers' fuel agent is vice president of the Union Fuel Company. Twenty per cent of the stock of that company stands in the vice president's name, but is said to belong to the Western Coal & Mining Company. The remaining 80 per cent is owned in equal parts by the Consolidated Coal Company of St. Louis and the Big Muddy Coal & Iron Company (mentioned hereinafter). The Union Fuel Company was organized by these interests for the purpose of selling coal locally in East St. Louis, St. Louis, and suburbs.

Chicago, Milwaukee & St. Paul Railway Company.—The Chicago, Milwaukee & St. Paul Railway Company owns all the capital stock (\$350,000) of the St. Paul Coal Company. The latter has no bonded indebtedness, but on June 30, 1912, owed the carrier \$1,473,635.53 for cash advances. The carrier charges the coal company 5 per cent interest on advances.

The St. Paul Coal Company owns and leases about 30,884 acres of coal lands in La Salle, Putnam, and Bureau counties, in the State of Illinois. It operates two mines, which produced for shipment in the year ending June 30, 1912, 659,234 tons, of which lump and mine run, amounting to 562,329 tons, or 85.3 per cent, were sold to the railway company for fuel purposes; the remainder, consisting entirely of screenings, was sold to the B. F. Berry Coal Company, which marketed it commercially. The St. Paul Coal Company also leases to B. F. Berry Coal Company, on a royalty basis, 2,560 acres of its lands, upon which the latter operates one mine, producing 299,138 tons during the year ending June 30, 1912. This product is sold commercially.

The Chicago, Milwaukee & St. Paul Railway Company also owns all the capital stock (\$100,000) of the Braceville Coal Company, which owns about 3,000 acres of coal lands and one mine in Grundy county, in the state of Illinois. This mine has not been worked since early in 1910, as the operation of the company was no longer profitable.

The carrier has from time to time made cash advances to the Braceville Coal Company, upon which interest at the rate of 5 per cent is

assessed. The amount outstanding on this account as of June 30, 1912, was \$79,682.15.

Illinois Central Railroad Company.—The Illinois Central Railroad Company owns the entire capital stock (\$5,000) of the Mississippi Valley Corporation, which in turn owns the entire capital stock (\$5,000) of the Madison Coal Corporation. The latter has no bonded indebtedness. One of the vice presidents of the railroad company is chairman of the board of directors of the coal corporation. The carrier makes advances to the Madison Coal Corporation, on which it charges 4 per cent interest. The amount outstanding on this account as of June 30, 1912, was \$1,859,000.

The Madison Coal Corporation owns and leases about 24,103 acres of coal lands and mineral rights in Madison, Macoupin, Montgomery, Sangamon, Williamson, and St. Clair counties, in the state of Illinois. Of this, 4,135 acres have been worked out, and 14,877 acres are not available without additional mines and railway facilities. The corporation operates six mines on the lines of the Illinois Central having a daily aggregate capacity of about 10,400 tons. During the year ending June 30, 1912, these mines produced for shipment 1,629,324 tons, of which 1,615,892 tons, or 99.18 per cent, were sold to the Illinois Central, the balance being sold commercially. The carrier's purchases from the Madison Coal Corporation during that year constituted about 64 per cent of its total coal purchases in Illinois. It is stated that since September, 1911, the Madison Coal Corporation has sold no coal commercially, the railroad company taking the entire output of the six mines.

Chicago, Rock Island & Pacific Railway Company.—The Chicago, Rock Island & Pacific Railway Company owns all the capital stock (\$50,000) of the Coal Valley Mining Company. The latter has no bonded indebtedness. The carrier makes cash advances to the mining company, upon which no interest is assessed, amounts due the mining company for fuel coal furnished the carrier being applied against the advances. The amount due the carrier from the mining company as of June 30, 1912, was \$57,027.70. This includes a charge of \$19,500, representing a 39 per cent dividend declared by the mining company; the latter did not pay this in cash, the carrier merely charging the amount to the advance account. The Coal Valley Mining Company owns about 400 acres of coal lands and two mines, in Mercer county, in the state of Illinois. In the two years ending June 30, 1912, these mines produced 377,400 tons of coal, of which 69.5 per cent was sold to the railway company, and the balance commercially.

The Chicago, Rock Island & Pacific Railway Company also owns \$2,400,600 out of a total issue of \$3,400,600 of the capital stock, and \$273,000 out of a total issue of \$2,773,000 of the outstanding bonds of the Consolidated Indiana Coal Company. The carrier uncondi-

tionally guarantees the interest on \$2,500,000 of the bonds of the coal company, and on June 30, 1912, was required to advance to the latter \$62,500 under the guarantee.

The Consolidated Indiana Coal Company owns about 10,000 acres of coal lands and mineral rights in Sullivan county, in the state of Indiana, about 5,800 acres in Franklin county, in the state of Illinois, and about 4,900 acres in Marion and Lucas counties, in the state of Iowa. It operates five mines on its Indiana properties, producing in the two years ending June 30, 1912, 1,630,261 tons of coal, of which 28.4 per cent was sold to the Rock Island lines and the balance commercially. At present no coal is being produced from the Illinois properties; one mine is being developed in Iowa.

The carrier makes cash advances to the coal company from time to time, the amount outstanding as of June 30, 1912, being \$1,584,-085.97. No interest is assessed on these advances. No cash is received from the coal company to reduce this indebtedness, but the carrier applies against it the amounts of vouchers in favor of the coal company covering value of fuel coal furnished.

The Chicago, Rock Island & Pacific Railway Company is also interested in certain coal properties in Kansas and Colorado.

Chicago & Eastern Illinois Railroad Company.—The Chicago & Eastern Illinois Railroad Company owns all the capital stock (\$619,-300) of the Brazil Block Coal Company. The latter has no bonded indebtedness. The Brazil Block Coal Company owns about 2,910 acres of coal lands and mineral rights in Clay, Owen, Warren, and Vermilion counties in the state of Indiana, of which about 250 acres in the last-named county have been worked out. Since April 1, 1912, this concern has not been an operating company, its one mine and part of its lands being leased to the J. K. Dering Coal Company. The railroad company has, from time to time, made cash advances to the Brazil Block Coal Company, taking the latter's notes therefor. No interest is assessed on these advances. The amount due the railroad company on this account, as of June 30, 1912, was \$279,000.

The Chicago & Eastern Illinois Railroad Company owns all the capital stock (\$500,000) of the West Jackson Hill Coal Mining & Transport Company. The latter has no bonded indebtedness. The West Jackson Hill Company, in the spring of 1912, sold to the railroad company 3,025 acres of coal lands and mineral rights in Sullivan county, in the state of Indiana, and still owns about 4,742 acres, 3,020 of which are leased to other companies. The West Jackson Hill Company neither owns nor operates any mines. The carrier has from time to time made cash advances to the West Jackson Hill Company, upon which no interest is assessed. The amount due the railroad company on this account as of June 30, 1912, was \$74,880.56.

Cleveland, Cincinnati, Chicago & St. Louis Railway Company.—The Cleveland, Cincinnati, Chicago & St. Louis Railway Company owns all the capital stock (originally \$55,000, but increased in October, 1913, it is understood, to \$1,500,000) of the Chicago & Harrisburg Coal Company. The latter owns about 840 acres of coal lands in Saline county, in the state of Illinois. These lands were leased in 1910 to the Saline County Coal Company on a royalty basis, but have not as yet been developed. Further reference to the interest of this carrier in coal properties is embraced in the appendix to this report under New York Central lines, pages 33–49.

Illinois Traction Company.—The Illinois Traction Company owns the stock of the Illinois Securities Company, a holding company. The latter in turn owns control of the stock of the Danville Consumers Coal Company and the Kerns-Donewald Coal Company, operators of one mine each, on the lines of the Traction system. Part of the product of these mines is used in the operation of the traction company's power houses, the balance being sold commercially.

Vandalia Railroad Company.—The Pennsylvania Company owns the majority of the stock of the Vandalia Railroad Company and also owns the stock of the Granite Improvement Company. The Granite Improvement Company, in turn, owns the entire capital stock (\$20,000) of the Vandalia Mineral Company, having purchased it with funds furnished by the Vandalia Railroad Company. The Lumaghi Coal Company operates mines located in Madison county, in the state of Illinois, on the Vandalia Railroad, and ships its product over that line.

In 1905 the Vandalia Mineral Company borrowed \$240,000 from a St. Louis bank on its 12 notes indorsed by the Vandalia Railroad Company. The mineral company then loaned this amount, plus the \$20,000 received from the sale of its stock (or a total of \$260,000) to the Lumaghi Coal Company, on the latter's 13 notes secured by trust deeds to certain coal lands in Madison and St. Clair counties, in the state of Illinois. The mineral company's notes bear 4 per cent interest and are payable one each year, beginning with 1906. The Lumaghi notes bear 2 per cent interest and are also payable one each year, beginning with 1906. In other words, the Lumaghi Coal Company bought certain property with funds borrowed from the mineral company and placed the property in trust with the mineral company as security for the loan. The acreage purchased by the Lumaghi Company under this transaction, including certain transfers and exchanges, was about 9,733 acres. It was the intention that each year as the Lumaghi notes should be paid off, the Vandalia Mineral Company would transfer back to the Lumaghi

Company an equivalent value of the coal lands held in trust. About 578 acres were so transferred in 1906, after payment of the first note, but, although subsequent notes have been paid off, the equivalent in land has not yet been released; consequently, the mineral company now holds in trust, as security for the unpaid Lumaghi notes, about 9,155 acres.

The contract covering this transaction expressly stipulates that the Lumaghi Coal Company shall ship the product, not only of its mining operations on the lands so purchased, but of its operations on some 8,000 acres additional, already owned by it, over the lines of the Vandalia Railroad Company; this provision is also embodied in the instruments transferring the property back from the mineral company to the Lumaghi Company. Failure to so ship the product of its mines operates as a forfeiture of the Lumaghi Coal Company's rights to the lands in question. The business thus assured to the Vandalia Railroad approximates 150,000,000 tons.

The Lumaghi Coal Company operates two mines on this property near Cantine, in the state of Illinois (about 15 miles from St. Louis), from which 433,178 tons of coal were shipped during the year ending June 30, 1911.

As stated above, the rate of interest paid by the Vandalia Mineral Company for the funds borrowed from the bank is 4 per cent, while that charged the Lumaghi Coal Company is 2 per cent. The deficit thus caused is made up to the mineral company by the Granite Improvement Company, which in turn is reimbursed by the Vandalia Railroad Company. To all intents and purposes, therefore, ignoring roundabout methods, the Vandalia Railroad Company borrows money at 4 per cent, and loans it to a coal operator and shipper at 2 per cent, without any compensation, other than the traffic furnished; in fact, the whole transaction was entered into for the purpose of securing this traffic exclusively to the Vandalia Railroad Company. Up to date, the value of this concession to the coal company in dollars and cents is \$20,872.23. Such an arrangement as between a carrier and a shipper being considered a rebate in violation of the Elkins act, the matter was referred to the Department of Justice with the result that an indictment was returned against the carrier.¹

So far as can be learned, the Vandalia Railroad Company has no interest, either direct or indirect, in the securities of the Lumaghi Coal Company.

Chicago & Alton Railroad Company.—While the Chicago & Alton Railroad Company does not itself own any coal lands in Illinois, it is indirectly interested in coal acquired by subsidiaries of the Union Pacific Railroad Company.

¹ Very recently a jury verdict of guilty was returned on this indictment. Sentence has not yet been pronounced.

The Union Pacific Railroad owns the majority (\$10,343,100) of the preferred stock of the Chicago & Alton, but does not control the latter, that control being vested in the Clover Leaf route through ownership of a majority of the common stock. The Union Pacific Railroad owns the entire capital stock (\$5,000,000) and all the outstanding bonds (\$3,854,000) of the Union Pacific Coal Company. The Union Pacific Coal Company in turn owns the entire capital stock (\$100,000) of the Illinois Union Coal Company. The latter is a new company formed for the purpose of acquiring coal lands in Illinois, and its officials are clerks in the office of the Chicago & Alton Railroad.

The Illinois Union Coal Company is taking up options on approximately 25,000 acres of coal lands in Macoupin county, in the state of Illinois, along the line of the Chicago & Alton Railroad, and the president of the latter is in charge of these purchases. Although these properties have not as yet been developed, they are being acquired for the purpose of furnishing additional tonnage for the Chicago & Alton at some future time. The Union Pacific Railroad Company acts as financial agent for the Union Pacific Coal Company and the Illinois Union Coal Company, and one man acts as treasurer for all three companies. Drafts in settlement of properties purchased for the Illinois Union Coal Company are paid by the Union Pacific Railroad Company, the amounts being charged to the Union Pacific Coal Company on the railroad books.

FIRST (b). WHETHER ANY COMMON CARRIERS BY RAILROAD, SUBJECT TO THE INTERSTATE-COMMERCE ACT, * * * IN ANY MANNER OWN, CONTROL, OR HAVE ANY INTEREST IN COAL LANDS OR PROPERTIES * * *.

Chicago & Eastern Illinois Railroad Company.—The Chicago & Eastern Illinois Railroad Company holds by ownership and leasehold approximately 42,053 acres of coal lands and mineral rights in Montgomery county in the state of Illinois, and in Clay, Sullivan, and Vermilion counties in the state of Indiana. Upon these lands are 10 mines, 5 in each state, owned, but not operated, by the railroad company. This property, with the exception of about 628 acres of coal lands in Clay county, was acquired from the following companies with the proceeds of bonds issued for that purpose as of February 1, 1912:

Oak Hill Coal & Mining Company, 5 mines and 3,296 acres of coal, Vermilion county; West Jackson Hill Coal Mining & Transport Company, 3,025 acres of coal, Sullivan county; Peabody Coal Company, 1 mine and 10,490 acres of coal, Montgomery county; Burnwell Coal Company, 2 mines and 15,286 acres of coal, Montgomery county; Kortkamp Coal Company, 1 mine and 2,168 acres of coal, Mont-

gomery county; Montgomery County Coal Company, 1 mine and 7,160 acres of coal, Montgomery county.

J. K. Dering, a stockholder and director of the Oak Hill Coal & Mining Company, acted for the carrier in the acquisition of the property of that company. The Chicago & Eastern Illinois acquired the properties of the Peabody, Burnwell, Kortkamp, and Montgomery companies through A. R. Byrd & Sons, of St. Louis; the same is true of the properties of the West Jackson Hill Company, notwithstanding the fact that the entire capital stock of that concern was owned by the Chicago & Eastern Illinois Railroad. What profit accrued to A. R. Byrd & Sons or what disposition was made thereof does not appear of record in these proceedings.

The five mines and approximately 1,880 acres of the coal purchased of the Oak Hill company were leased on June 1, 1912, to the J. K. Dering Coal Company. Approximately 2,100 acres of the coal purchased of the West Jackson Hill company were leased on October 15, 1912, to the J. Woolley Coal Company, the carrier agreeing to construct one mine, and, if necessary, two additional mines, on the property. The mines of the Peabody, Burnwell, Kortkamp, and Montgomery companies, together with approximately 12,500 acres of the coal acquired of them, were leased on May 1, 1912, to the Peabody Coal Company. The terms of these leases are more or less similar, and cover a period of 30 years each. They provide for a fixed annual rental for the properties (in the case of the Peabody company the amount increasing with the tonnage output), a small royalty per ton of coal mined during the first five years, increasing thereafter, and 5 per cent interest on the cost of additions and improvements which are to be made by the carrier. The carrier pays all taxes. In the Dering and Peabody leases the carrier agrees to purchase certain minimum tonnages of fuel coal per year; in the Woolley lease it agrees to purchase all coal required for certain divisions; in all three the carrier is given the right to demand up to 50 per cent of the output. The prices payable by the carrier for coal furnished are determined by adding a flat amount per ton to the cost of production, including all royalties, interest, depreciation, and overhead expenses.

It is worthy of notice in this connection that five mines and certain lands acquired by the carrier of the Oak Hill company, of which J. K. Dering was a part owner, were leased back to a company formed by Mr. Dering; also that one mine and part of the lands acquired by the carrier of the Peabody company were leased with other mines and coal back to the Peabody Coal Company. It is stated positively by officials of the carrier and of both these

coal companies that the carrier has no interest, direct or indirect, in the securities of the coal companies.

A distinct advantage accrues to the three coal companies from these leases, in that they are spared the expense of heavy carrying charges on undeveloped coal lands, and their funds are free to be used as working capital. For example, the Peabody Coal Company, before it sold its properties to the carrier, had several hundred thousand dollars invested in properties, whereas now it has more mines and coal than before, but without any investment, and consequently has no bonded indebtedness upon which to pay interest. Furthermore, these companies at all times make a substantial profit on coal sold to the carrier; many operators are obliged to take railroad contracts at cost or even less in order to keep their mines running during the summer, trusting to commercial sales to furnish their profit. The advantages which the J. K. Dering Coal Company, the J. Woolley Coal Company, and the Peabody Coal Company thus enjoy in competing with other operators in the commercial markets are obvious.

Cleveland, Cincinnati, Chicago & St. Louis Railway Company.—The Cleveland, Cincinnati, Chicago & St. Louis Railway Company purchased in 1905, 1906, and 1907 about 23,000 acres of coal lands and mineral rights in Saline and Williamson counties, in the state of Illinois, and has since purchased 13,500 acres more in those counties. In addition it contracted in 1912 for the purchase of some 60,000 acres in Christian and Montgomery counties, this property being paid for by the Lake Shore & Michigan Southern Railway Company. Titles to these properties were taken in the name of the Guaranty Trust Company of New York, as trustee, so that the property would not be subject to the general mortgages of the railway companies.

About 4,700 acres of lands in Saline county have been leased on a royalty basis to the Saline County Coal Company; part of this property is being developed in connection with that company's mine No. 3, the remainder being undeveloped. While the amount of royalty exacted by the carrier is small as compared with that existing in eastern coal fields, it seems to have been the prevailing rate in the Harrisburg district at the time these leases were made. Further details of the earlier acquisitions of coal lands by this carrier will be found in the appendix to this report under the caption New York Central lines, pages 33-49.

Chicago, Burlington & Quincy Railroad Company.—The Chicago, Burlington & Quincy Railroad Company owns about 30,851 acres of coal lands and mineral rights in Franklin, Montgomery, and Macoupin counties, in the state of Illinois. The properties are undeveloped, and the carrier's officials state that there is no intention of developing them in the near future.

SECOND. WHETHER THE OFFICERS OF ANY OF THE CARRIER COMPANIES AFORESAID, OR ANY OF THEM, OR ANY PERSON OR PERSONS CHARGED WITH THE DUTY OF DISTRIBUTING CARS OR FURNISHING FACILITIES TO SHIPPERS ARE INTERESTED, EITHER DIRECTLY OR INDIRECTLY, BY MEANS OF STOCK OWNERSHIP OR OTHERWISE, IN CORPORATIONS OR COMPANIES OWNING, OPERATING, LEASING, OR OTHERWISE INTERESTED IN ANY COAL MINES, COAL PROPERTIES, OR COAL TRAFFIC * * * OVER THE RAILROADS WITH WHICH THEY OR ANY OF THEM ARE CONNECTED OR BY WHICH THEY OR ANY OF THEM ARE EMPLOYED.

Toledo, St. Louis & Western Railway Company.—Several of the officials of the Toledo, St. Louis & Western Railway Company were formerly interested in the securities of the Shoal Creek Coal Company, but it is stated that all have disposed of their holdings, with the exception of Thomas Hubbard, chairman of the board. The capital stock of the Shoal Creek Coal Company is \$1,000,000 common and \$60,000 preferred, of which Mr. Hubbard owns \$146,500 and \$9,600, respectively. The president of the coal company states that he owns 84 per cent of the outstanding bonds; none, so far as can be learned, is held by railroad officials.

The Shoal Creek Coal Company owns about 14,000 acres of coal lands and mineral rights in Montgomery and Bond counties, in the state of Illinois, and owns and operates one mine at Panama, on the Toledo, St. Louis & Western. This mine produced, in the year ending June 30, 1912, 445,875 tons of coal, of which 204,990 tons, or 46 per cent, were sold to the Toledo, St. Louis & Western. Payments to the coal company by the carrier during the same year constituted 71 per cent of the carrier's entire fuel cost.

On April 1, 1911, the Toledo, St. Louis & Western contracted, for part of its fuel supply, with the Clover Leaf Coal Mining Company (in which Geo. H. Ross, then vice president of the carrier, was interested). Beginning with August, 1911, the output of this company's mine was taken by the Bickett Coal & Coke Company, which assumed the contract with the carrier. On September 1, 1911 (after Mr. Ross's retirement as vice president), the carrier made a contract with the Shoal Creek Coal Company, expiring April 1, 1914. It develops that the prices named in this contract were in excess (8 cents for lump and 5 cents for mine run) of that at the time being paid the Bickett Company. This contract provided that the price should increase or decrease in harmony with any changes in the mining wage scales; accordingly, on April 1, 1912, the prices were increased 5 cents per ton. On the same date the contract with the Bickett Company expired, and since that time the carrier has purchased no coal from it. The president of the Bickett Company states

that he has been unable to secure a contract with the carrier, but would be glad to sell it coal at a certain price. That certain price is 7 cents per ton less than the carrier is paying the Shoal Creek Coal Company. It can hardly be claimed that mining conditions account for this difference in price, for the following reasons:

The mines are located in the same district and county, 9 miles apart; they pay the same mining wage scales; they are working in the same geological seam; the thickness of the seam is 6 inches greater in the case of the Shoal Creek mine; the depth of the coal is 20 feet less in the case of the Shoal Creek mine; other conditions are the same, except that the Shoal Creek coal is mined by machine, that of its competitor by hand, and the production of the former is double that of the latter. The cost of production, therefore, would appear to be less, if anything, in the case of the Shoal Creek Company than in that of the Bickett Coal & Coke Company.

Chicago Junction Railway Company.—Mr. R. Fitzgerald, president of the Chicago Junction Railway Company, owns the capital stock of the Grant Coal Mining Company. The coal company formerly operated one mine at Burnett, Vigo county, in the state of Indiana, but abandoned it about April 1, 1912. Mr. Fitzgerald has purchased other coal properties in the Clinton district, in the state of Indiana, and is arranging to sink a shaft thereon. The operations of the new mine will be conducted under the name of the Grant Coal Mining Company. It is said that the Grant company has never sold any coal to the Chicago Junction Railway Company or to any other company with which Mr. Fitzgerald is officially connected, and that the same policy will obtain when the new mine is opened.

The Wabash Railroad Company.—The Wabash Railroad Company is now in the hands of receivers. A list of the stockholders of this carrier as of October 3, 1911, shows the stock to be largely held in the names of members of the Gould family and J. J. Slocum (who, it is understood, represents the Russell Sage estate). The records of the Consolidated Coal Company of St. Louis show the stock of that company to rest largely with members of the Gould family and Olivia H. Sage. The Consolidated Coal Company of St. Louis (together with the Western Coal & Mining Company and the Big Muddy Coal & Iron Company) owns the stock of the Union Fuel Company, which is merely a selling and not an operating company.

The Consolidated Coal Company of St. Louis owns and leases about 29,561 acres of coal lands and mineral rights in Madison, Macoupin, and Clinton counties, in the state of Illinois. It operates five mines, three of which are located on the Wabash, one on the Vandalia, and one on the Baltimore & Ohio Southwestern. These

mines produced in the year ending June 30, 1912, 1,773,549 tons of coal. Of this tonnage, there were sold to the Wabash 330,829 tons, or about 18½ per cent, and to the Missouri Pacific-Iron Mountain lines 428,113 tons, or about 24 per cent; the remainder was sold commercially, principally in Chicago, St. Louis, the west and northwest.

Missouri Pacific Railway Company and St. Louis, Iron Mountain & Southern Railway Company.—O. L. Garrison, president of the Big Muddy Coal & Iron Company, is a stockholder and was formerly a director of the Missouri Pacific. He is now a director of the Iron Mountain, qualifying therefor by the holding of five shares of stock belonging to the Missouri Pacific.

The Big Muddy Coal & Iron Company owns and leases about 9,772 acres of coal lands and mineral rights in Jackson and Williamson counties, in the state of Illinois, and operates four mines. The St. Louis, Iron Mountain & Southern serves three of these mines, the Chicago, Burlington & Quincy two, and the Illinois Central all four. These mines produced in the year ending June 30, 1912, 1,172,945 tons of coal, of which the Missouri Pacific-Iron Mountain lines bought 276,378 tons, or about 23½ per cent, the remainder being sold commercially.

Southern Railway Company.—Three traffic officials of the Southern Railway Company own small blocks of the securities of the Southern Coal & Mining Company. These officials are located, respectively, at Charleston, Memphis, and Louisville, and with the possible exception of the Louisville official, have nothing to do with traffic furnished by the coal company. All three gentlemen express themselves as intending to sell their securities as soon as they can obtain a favorable market.

The Southern Coal & Mining Company operates 10 mines in St. Clair county and one in Clinton county in the state of Illinois, served by the Southern Railway. The production of these mines during the year ending June 30, 1912, was 1,035,832 tons, of which there were sold to the Southern Railway Company 102,936 tons, or about 10 per cent.

Baltimore & Ohio Southwestern Railway Company.—Mr. E. C. Kramer, of East St. Louis, district attorney of the Baltimore & Ohio Southwestern Railway Company, owns 15 shares of the stock of the Breese Trenton Mining Company, an operator on the carrier's lines in Illinois.

New York Central lines.—W. C. Brown and certain other officials of the New York Central lines were active in the promotion of two companies operating in Saline county—the Saline County Coal Company and the O'Gara Coal Company, and formerly owned large

blocks of the securities of those companies; most of these persons, however, have now disposed of their holdings. The Saline County Coal Company was incorporated in April, 1907, with a capital stock of \$375,000. It later issued bonds to the amount of \$300,000. In October, 1908, the bonded indebtedness of the Saline County Coal Company was increased to \$1,000,000, of which there is said to be now outstanding \$574,000. In July, 1910, the capital stock was increased to \$1,250,000, of which there is said to be now outstanding \$689,125. According to the record, the Saline County Coal Company holds about 7,000 acres of coal lands and mineral rights, about 80 per cent of which is leased from the Cleveland, Cincinnati, Chicago & St. Louis Railway Company as indicated hereinbefore. The coal company owns three mines, one of which has been worked out and abandoned; the other two were constructed with the proceeds of the later issues of bonds and stocks and are located on property leased from the railway company and others. The Saline County Coal Company's production for shipment is said to be from 80 to 100 cars of coal per day, part of which output is sold to the New York Central lines for locomotive fuel and the remainder commercially. It is understood that this company has recently acquired the control of the Harrisburg Southern Coal Company, operating a mine near Eldorado, in the state of Illinois.

The O'Gara Coal Company was incorporated in July, 1905, and took over for development properties consisting of coal lands and mines which had been secured under options several months previously by Thomas J. O'Gara and others. The company was capitalized at \$6,000,000 and later issued bonds to the amount of \$3,000,000. It holds at present by lease and ownership more than 30,000 acres of coal lands and mineral rights in the Harrisburg District. It owns about 14 mines, 2 or 3 of which are now worked out and closed down. The company is said to produce for shipment from 200 to 300 cars of coal per day, a large part of which output is sold to the New York Central lines for locomotive purposes and the balance to other carriers and industries in Chicago, the west, and northwest. In September, 1913, the O'Gara Coal Company went into voluntary bankruptcy, and receivers in the persons of Thomas J. O'Gara and Fred A. Busse were appointed by the court to administer its affairs.

Further details relating to the activities of the carriers' officials in connection with these coal companies will be found in the appendix to this report, pages 33-49.

THIRD. WHETHER THERE IS ANY CONTRACT, COMBINATION IN THE FORM OF TRUST, OR OTHERWISE, OR CONSPIRACY IN RESTRAINT OF TRADE OR COMMERCE AMONG THE SEVERAL STATES, IN WHICH ANY COMMON CARRIER ENGAGED IN THE TRANSPORTATION OF COAL OR OIL IS INTERESTED, OR TO WHICH IT IS A PARTY; AND WHETHER ANY SUCH COMMON CARRIER MONOPOLIZES OR ATTEMPTS TO MONOPOLIZE, OR COMBINES OR CONSPIRES WITH ANY OTHER CARRIER, COMPANY OR COMPANIES, PERSON OR PERSONS TO MONOPOLIZE ANY PART OF THE TRADE OR COMMERCE IN COAL OR OIL, OR TRAFFIC THEREIN AMONG THE SEVERAL STATES OR WITH FOREIGN NATIONS, AND WHETHER OR NOT, AND IF SO, TO WHAT EXTENT SUCH CARRIERS, OR ANY OF THEM, LIMIT OR CONTROL, DIRECTLY OR INDIRECTLY, THE OUTPUT OF COAL MINES OR THE PRICE OF COAL AND OIL FIELDS OR THE PRICE OF OIL.

Elgin, Joliet & Eastern Railway Company.—Subsidiaries of the United States Steel Corporation own the capital stock of the Chicago, Lake Shore & Eastern Railway Company and that of the Elgin, Joliet & Eastern Railway Company. The property of the former railway is operated under lease by the latter.

The Steel Corporation, through its subsidiary steel companies, has for several years been acquiring coal properties in Indiana and Illinois, until on December 31, 1911, it owned 63,993 acres of coal lands and mineral rights and six mines (one now closed down). These properties are located in Vermilion, Franklin, and Williamson counties, in the state of Illinois, and in the Clinton field, in the state of Indiana. The mines are operated by the Bunsen Coal Company (owned by the Federal Steel Company) and are located, four at or near Westville, in the state of Illinois, and one near Clinton, Ind.

Under date of February 1, 1909, the Chicago, Lake Shore & Eastern Railway Company entered into a contract with the Chicago & Eastern Illinois Railroad Company whereby the former was granted certain trackage rights for the hauling of coal, sand, stone, etc., over portions of the lines of the latter. The Chicago, Lake Shore & Eastern's part of this contract is now fulfilled by its lessee, the Elgin, Joliet & Eastern. By virtue of this contract the Elgin, Joliet & Eastern Railway moves traffic by its own power from points on the Chicago & Eastern Illinois to steel plant destinations on its own rails, and files with the Commission the rates governing the traffic. The Chicago & Eastern Illinois publishes like rates from the same points of origin on its own lines to the same Elgin, Joliet & Eastern destinations. In other words, the traffic can move from, say, Westville, in the state of Illinois, to Gary, in the state of Indiana, (1) via Elgin, Joliet & Eastern trains all the way, or (2) via Chicago & Eastern

Illinois trains to Chicago Heights, thence to destination via the Elgin, Joliet & Eastern.

In the former case (i. e., where the traffic moves under Elgin, Joliet & Eastern tariff) the Elgin, Joliet & Eastern, in addition to incurring the expense of operating its trains, pays the Chicago & Eastern Illinois a trackage charge based on a train-mile rate (in most cases \$1). That a large volume of traffic moves in this manner is evidenced by the fact that during the year ending June 30, 1912, these trackage charges aggregated \$576,507.35. In the latter case (i. e., where the traffic moves under the Chicago & Eastern Illinois tariff), although it is doubtful if any considerable tonnage moves in this manner, the Elgin, Joliet & Eastern receives a substantial division of the through rate. For instance, in a haul from, say, Westville to Gary the 74-cent rate divides 44 cents to the Chicago & Eastern Illinois for a 107-mile haul (or less than one-half cent per ton-mile) and 30 cents to the Elgin, Joliet & Eastern for a 25-mile haul (or about one and one-fifth cents per ton-mile).

It is therefore obvious that business moving under the Elgin, Joliet & Eastern tariff is more advantageous to the Elgin, Joliet & Eastern than that moving under the Chicago & Eastern Illinois tariff; otherwise the traffic would move under the latter. Upon the theory that these rates are profitable, inasmuch as they were established voluntarily by the carriers, the Chicago & Eastern Illinois presumably makes a profit when it hauls the traffic to Chicago Heights. Even taking into consideration the trackage charge, it is doubtful whether it costs the Elgin, Joliet & Eastern any more to make the haul to Chicago Heights than it does the Chicago & Eastern Illinois, or even as much. Hence, any profit that results from the mines-to-Chicago Heights haul under the Elgin, Joliet & Eastern tariff is made by the Elgin, Joliet & Eastern, and indirectly inures to the benefit of its principals, the subsidiary steel companies of the United States Steel Corporation. The Chicago & Eastern Illinois accordingly makes less by this arrangement than if it handled the business over its own rails; consequently the Chicago & Eastern Illinois contributes to the benefit accruing indirectly to the steel companies.

FOURTH.—IF THE INTERSTATE COMMERCE COMMISSION SHALL FIND THAT THE FACTS, OR ANY OF THEM, SET FORTH IN THE THREE PARAGRAPHS ABOVE DO EXIST, THEN THAT IT BE FURTHER REQUIRED TO REPORT AS TO THE EFFECT OF SUCH RELATIONSHIP, OWNERSHIP, OR INTEREST IN COAL OR COAL PROPERTIES AND COAL TRAFFIC, OR OIL, OIL PROPERTIES, OR OIL TRAFFIC AFORESAID, OR SUCH CONTRACTS OR COMBINATIONS IN FORM OF TRUST OR OTHERWISE, OR CONSPIRACY OR SUCH MONOPOLY OR ATTEMPT TO MONOPOLIZE OR COMBINE OR CONSPIRE AS AFORESAID, UPON SUCH PERSON OR PERSONS AS MAY BE ENGAGED INDEPENDENTLY OF ANY OTHER PERSONS IN MINING COAL OR PRODUCING OIL AND SHIPPING THE SAME, OR OTHER PRODUCTS, WHO MAY DESIRE TO SO ENGAGE, OR UPON THE GENERAL PUBLIC AS CONSUMERS OF SUCH COAL OR OIL.

One of the evils likely to arise from the interest of railway companies in coal properties is discrimination in purchases of coal for the carriers' own use. Railroad coal is generally purchased under yearly contracts which provide a minimum tonnage which the carrier must take and a maximum tonnage which it may demand. The contracts are usually let at low prices, operators being very anxious to secure them, even though unremunerative, in order to keep their mines running during the summer; they depend for their profit, as heretofore stated, upon the increased commercial demand and higher prices obtaining during the winter months.

If the carrier has no interest, direct or indirect, in the coal properties on its lines, there is no incentive to distribute its orders for fuel coal otherwise than equitably among the operators. If, on the other hand, the carrier is interested in certain properties, and not in others, it can distribute its fuel orders in such a way as to redound to the advantage of its associated operator and to the disadvantage of the independent operator. This can be accomplished by ordering the contract minimum tonnage of the independent operator during the summer, when commercial demands are light and prices low, and demanding the contract maximum tonnage of him during the winter months when commercial demands are heavy and prices high. In other words, during the season when commercial business is slack, the associated operator may get more than an equitable share of railroad orders, and is enabled to keep his mines running and his yearly average cost per ton low, whereas the independent operator may get less than his equitable share of railroad orders and his yearly average cost per ton will be correspondingly higher. In the season when commercial business is brisk the carrier may demand of the associated operator as little tonnage as possible, leaving him free to secure profitable commercial orders, whereas it may demand its maximum tonnage of the independent operator, and thus keep him from secur-

ing his share of the profitable commercial business. Yet, despite this possible disadvantage, the independent operator is glad to secure whatever railroad orders he can, as his cost per ton is thereby less than if he received no railroad orders at all.

A more potent evil arising from the mutual interests of carriers and coal companies lies in the fact that, inasmuch as there are in reality two profits, one in the sale and the other in the transportation of the coal, the profit in the freight rate becomes an added factor in the competition for commercial coal business. When an independent operator pays freight, demurrage, or reconsigning charges he parts with his money permanently, whereas in the case of an operator associated with the carrier, such payments merely effect a transfer from one treasury to another, the two profits remaining in the possession of the joint interests. The same results obtain, of course, even if the consignee pays the charges. It would therefore appear that the associated operator can undersell his independent competitor by the amount of the profit on the freight rate, yet the joint interests will still be making as much profit as is the independent operator producing coal at the same cost and selling it at the same price.

This condition is perhaps more flagrant in the vicinity of East St. Louis than in other parts of Illinois. It is particularly aggravated there, by reason of the presence of what are known as industrial railroads which are under the same ownership as the mines which they serve.

As illustrating the relations between industrial railroads and coal companies, the following instances are cited, all of which, it should be understood, refer to the period covered by the Commission's investigation:

St. Louis, Troy & Eastern Railway Company.—The Merchants' & Manufacturers' Investment Company owns the capital stock of the St. Louis, Troy & Eastern Railway Company, and also that of the Donk Brothers Coal & Coke Company. The St. Louis, Troy & Eastern Railway Company operates about 19 miles of main track between East St. Louis and Troy, and 7 miles of track between Edwardsville and Formosa, in the state of Illinois. There are but three mines on the lines of this carrier, and they belong to the Donk Brothers Coal & Coke Company. The tonnage produced by these mines and shipped over the lines of the carrier, and the percentage it bears to the total tonnage of all kinds handled, follows:

Year ending June 30—	Tonnage of Donk mines shipped over the lines of the carrier.	Percentage of tonnage from Donk mines to total tonnage handled.
1909.....	823, 236	96.64
1910.....	814, 178	93.56
1911.....	810, 989	85.62
1912.....	754, 938	80.01

The remainder of the tonnage hauled by the St. Louis, Troy & Eastern consists principally of anthracite coal and oils. Anthracite coal has for the past three years constituted between 4 and 5 per cent of the total tonnage handled by the carrier. The traffic originates in the east and is turned over to the St. Louis, Troy & Eastern at Edwardsville by the Toledo, St. Louis & Western (Clover Leaf route) for haul to East St. Louis. Until recently the St. Louis, Troy & Eastern has enjoyed a division of $17\frac{1}{4}$ per cent of the through rate for its haul of less than 25 miles. It is stated that this division is now but $12\frac{1}{4}$ per cent. The reason for this routing, when the Clover Leaf could, with shorter mileage, move the traffic all the way to East St. Louis, is apparent, when it is stated that about 64 per cent of this anthracite traffic is consigned to Donk Brothers Coal & Coke Company. The remainder is consigned to Devoy & Kuhn Coal & Coke Company. There is said to be no relation between these two coal companies other than that of seller and buyer.

The point may be illustrated by a concrete example:

On a shipment of anthracite coal in January, 1912, from Black Rock, N. Y., consigned to Donk Brothers Coal & Coke Company, at East St. Louis, Ill., the through rate was \$1.95 plus a bridge arbitrary of 30 cents. The \$1.95 rate divided, 49 per cent, or \$0.96, to the Pere Marquette, for a haul of about 307 miles from Bridgeburg, Ont., to Toledo, Ohio; $33\frac{1}{4}$ per cent, or \$0.65, to the Clover Leaf, for a haul of about 433 miles from Toledo to Edwardsville; and $17\frac{1}{4}$ per cent, or \$0.34, to the St. Louis, Troy & Eastern for a haul of less than 25 miles from Edwardsville to destination.

The Clover Leaf, by hauling the traffic 18 miles farther (Edwardsville to East St. Louis), instead of turning it over to the connecting line, could secure 51 per cent of the through rate, or, in the instance cited, $99\frac{1}{4}$ cents (less possibly a switching charge at destination). The haul from Edwardsville to East St. Louis is competitive, and it is obvious that the Clover Leaf would not turn over this business to a competitor, especially at such an exorbitant division of the rate, were not the St. Louis, Troy & Eastern associated with the Donk Company; it was no doubt to secure its own haul that it consented to such an arrangement. The result is that the interests controlling the coal company and the carrier receive the benefit of the profit on the Edwardsville-to-East St. Louis haul, in addition to any profit accruing on the sale of the coal. The same interests also benefit in connection with shipments routed in the same manner but consigned to Devoy & Kuhn Coal & Coke Company.

The profit from all operations of the carrier from the date of its formation to December 31, 1911 (about 11 years), was nearly \$1,500,000, or an average of \$136,000, or 39 per cent, yearly on an original capitalization of \$350,000.

The advantages which the joint interests enjoy by virtue of the control of both railroad and coal company over owners of coal companies not similarly situated are apparent.

St. Louis & O'Fallon Railway Company.—The St. Louis & O'Fallon Railway Company, the St. Louis & O'Fallon Coal Company, and the Western Anthracite Coal & Coke Company are interrelated through a common control of the stock.

The St. Louis & O'Fallon Railway extends from East St. Louis to mine No. 2, a distance of about 8.64 miles. Located upon the tracks of this carrier are the two mines of the St. Louis & O'Fallon Coal Company. The output of these mines is purchased by the Western Anthracite Coal & Coke Company, moves over the lines of the carrier to East St. Louis, and is sold principally in the St. Louis market. The tonnage produced by the O'Fallon mines, and shipped over the line of the carrier, and the percentage it bears to the total tonnage of all kinds handled, follow:

Year ending June 30—	Tonnage of the two mines shipped over line of St. Louis & O'Fallon Ry.	Percentage it bears to the total tonnage handled.
1909.....	575,555	79.25
1910.....	800,630	66.55
1911.....	799,903	58.01
1912.....	690,492	58.33

The balance of the carrier's traffic is largely composed of coal originating at two mines on the East St. Louis & Suburban Railway. Traffic other than coal constitutes less than 1 per cent of the road's business, and half of this consists of supplies for the O'Fallon mines.

That the operations of the St. Louis & O'Fallon Railway Company are profitable is evidenced by the fact that its income account for the year ending June 30, 1912, shows a surplus of \$74,237.99, after paying a dividend of 10 per cent, amounting to \$15,000. The fact that this surplus remains under the control of the interests that own the coal company, as well as the railway, gives a distinct advantage in the competition for coal business over coal companies which are not similarly associated with railways. The profit in the operation of the railway would, if desired, permit the joint interests to undersell their competitors in the coal market and still be at least on an equality with them, so far as the amount of profit per ton is concerned.

Litchfield & Madison Railway Company.—The Illinois Company, a holding company, owns the controlling interest in the stock of the Litchfield & Madison Railway Company and is said also to own the control of the Mount Olive & Staunton Coal Company.

The Litchfield & Madison Railway is located in Madison county and is about 50 miles in length. Of the total traffic handled by the carrier during the year ending June 30, 1912, 787,897 tons, or 89½ per cent, consisted of coal from the two mines of the Mount Olive & Staunton Coal Company and 50,516 tons, or 5½ per cent, from other mines. The balance of the carrier's traffic, 4½ per cent, was general in character. The coal produced by the Mount Olive & Staunton mines is said to be of a high domestic grade; by far the larger portion of it is sold commercially in the St. Louis market. Less than 1 per cent of the output is sold to the Litchfield & Madison for locomotive purposes.

Owing to the common ownership of the carrier and the coal company and the fact that the product of the latter is hauled by the former, it would appear that any profit in the freight rate can, if necessary, be used as a factor in competing for commercial coal business.

Springfield Terminal Railroad Company.—The Springfield Terminal Railroad Company operates 7 miles of track (including switches and leased lines) near Springfield, Sangamon county, in the state of Illinois. It connects with seven other railroads running into Springfield, and all its traffic is moved under a switching tariff on file with the Commission. Under this tariff the carrier receives \$1 and \$2 per car for switch movements. The stock of the Springfield Terminal Railroad Company is owned, it is said, by the same interests that own the Jones & Adams Coal Company. This coal company operates one mine on the line of the carrier, producing, in the year ending June 30, 1911, about 385,000 tons of coal.

Chicago & Illinois Midland Railroad Company.—The Chicago & Illinois Midland Railroad Company is controlled by the Commonwealth Edison Company and the Peabody Coal Company through joint ownership of the stock. This road is about 25 miles in length and connects with the Illinois Central, the Chicago & Alton, the Wabash, and the Baltimore & Ohio Southwestern, with all of which it has joint rates, receiving, on traffic destined for Chicago, divisions amounting to about 20 per cent of the through rate.

The Commonwealth Edison Company and Francis S. Peabody control the Illinois Midland Coal Company, which operates two mines in Sangamon county, one at Pawnee, on the Chicago & Illinois Midland, and one at Sherman, on the Chicago & Alton. These mines produced for shipment in the year ending June 30, 1911, 357,044 and 168,576 tons, respectively.

Chicago, Ziegler & Gulf Railroad Company.—The Chicago, Ziegler & Gulf Railroad is a line 5.34 miles in length (including sidings) located in Franklin county, in the state of Illinois. It is owned by Joseph Leiter and serves only the mine of the Ziegler Coal Company.

The stock of the Ziegler Coal Company stands in the name of the trustees of the estate of L. Z. Leiter. Mr. Joseph Leiter is a trustee as well as being one of the beneficiaries of the estate. This company owns one mine at Ziegler, in the state of Illinois, which was leased on a royalty basis April 1, 1910, to the Bell & Zoller Coal Company, which still operates it.

Commercial coal shipped via the Chicago, Ziegler & Gulf Railroad in the year ending June 30, 1912, amounted to 400,582 tons. The coal used by the carrier amounted to 884 tons. The Chicago, Ziegler & Gulf Railroad connects with the Chicago, Burlington & Quincy Railroad, Illinois Central Railroad, and the St. Louis, Iron Mountain & Southern Railway, and formerly received allowances from those carriers for the haul of loaded and empty cars between their rails and the mine of the Ziegler Coal Company. These allowances have been discontinued, however, on account of the decision in 27 I. C. C., 353, wherein the Commission ruled that the Chicago, Ziegler & Gulf may not be the recipient of divisions of through interstate rates or receive allowances for the services it renders.

FIFTH. THAT SAID COMMISSION BE ALSO REQUIRED TO INVESTIGATE AND REPORT THE SYSTEM OF CAR SUPPLY AND DISTRIBUTION IN EFFECT UPON THE SEVERAL RAILWAY LINES ENGAGED IN THE TRANSPORTATION OF COAL OR OIL AS AFORESAID, AND WHETHER SAID SYSTEMS ARE FAIR AND EQUITABLE, AND WHETHER THE SAME ARE CARRIED OUT FAIRLY AND PROPERLY; AND WHETHER SAID CARRIERS, OR ANY OF THEM, DISCRIMINATE AGAINST SHIPPERS OR PARTIES WISHING TO BECOME SHIPPERS OVER THEIR SEVERAL LINES, EITHER IN THE MATTER OF DISTRIBUTION OF CARS OR IN FURNISHING FACILITIES OR INSTRUMENTALITIES CONNECTED WITH RECEIVING, FORWARDING, OR CARRYING COAL OR OIL AS AFORESAID.

The problem of equitable car distribution is composed of two factors—(1) The ratings of the mines and (2) the actual distribution of equipment in accordance therewith. The purpose of a carrier in fixing ratings for mines on its lines is to determine the basis upon which each shall share in the equipment available for coal loading during the periods when the supply of cars is insufficient to meet all the requirements. At such times it becomes necessary to place some restriction upon all the mines, and in order to do this impartially the practice of rating them and distributing the available equipment pro rata, on the basis of such ratings, has been adopted. Many of the Illinois roads have published rules governing the ratings of mines and the distribution of cars among them, and practically all have some definite plan of handling car-shortage situations. These rules and plans, however, are not uniform on the several roads; on the contrary, each road has endeavored to solve its own problem independently. A great deal of dissatisfaction has been felt by mine operators

with the various systems of ratings and distribution, and numerous allegations of unfairness and discrimination have been made. The result has been considerable litigation before this Commission and the courts.

Generally speaking, Illinois roads rate the mines served by them on the basis of commercial capacities of the mines. If fair and correct methods of determining the relative capacities of mines are used, this may afford a reasonably equitable basis for rating, but, unfortunately, this has not always been the case. In the proceeding *In re Irregularities in Mine Ratings*, 25 I. C. C., 286; the Commission expressed the opinion that the carrier should rate its mines on an hourly production basis, figured as follows: Total tonnage produced and shipped by a mine during the month should be divided by the number of hours the mine worked in producing it; the quotient should be multiplied by the number of hours in a working day, thus determining the daily rating of the mine; these ratings to be revised monthly.

As to actual distribution of cars in accordance with the relative ratings of the mines, the opinion of the Commission is clearly set forth in *Traer v. C. & A. R. R. Co.*, 13 I. C. C., 451, and it was sustained by the Supreme Court of the United States in 215 U. S., 452 and 479. Formerly, few of the roads counted against the mine ratings company fuel cars (i. e., cars to be loaded with the carrier's own fuel); private cars (i. e., cars owned or leased by coal companies); or foreign consigned cars (i. e., cars delivered by foreign roads for loading at particular mines). In the case just cited, the Commission ruled that all three classes of cars should be counted against the ratings as well as those furnished for commercial loading. In cases where the carrier takes the entire output of a mine, however, it has been considered permissible to deduct the number of cars delivered to that mine from the available supply before prorating among mines shipping commercial coal, or both commercial and railroad coal. In a few instances it develops that only open cars are counted against mine ratings. In other words, if an operator has facilities for loading box cars, such cars of that class as he receives are in addition to his rating proportion. The argument advanced by the carriers in this connection is that the plan has a tendency to stimulate mines to install box-car loaders, and that the more box cars that can be used in this traffic, the less likelihood is there of a coal-car shortage. This plan is not in accordance with the Commission's rulings.

When the carriers adjust their rules governing ratings and distribution in accordance with the views of the Commission as expressed in the cases cited, no doubt many of the irregularities now

existent will be eliminated. Most of the carriers appear to be endeavoring to distribute available cars during car-shortage periods in an equitable manner, although in a few instances such has been found not to be the case. The following instances will serve to show the practices obtaining on several of the Illinois coal-carrying roads, at the time of the Commission's investigation:

Atchison, Topeka & Santa Fe Railway Company.—The Atchison, Topeka & Santa Fe Railway Company has no published rules governing the distribution of cars among mines served by it. There are but few mines on the rails of the Santa Fe in Illinois, and it is said little difficulty has been experienced in supplying their demands. In times of car shortage the mines are rated according to commercial capacity, and all cars are counted against these ratings.

Chicago & North Western Railway Company.—As there are but three mines located on the lines of the Chicago & North Western Railway, proper, in Illinois, and all belong to one coal company, the question of equitable car distribution does not arise.

Chicago, Indianapolis & Louisville Railway Company.—It is stated that there are but six mines on the lines of the Chicago, Indianapolis & Louisville Railway; all of them are located in Indiana, and owing to the fact that all of them belong to one company, the question of equitable car distribution does not arise.

Chicago, Terre Haute & Southeastern Railway Company.—The Chicago, Terre Haute & Southeastern Railway Company has no published rules governing the distribution of coal cars. Cars of all classes are distributed among the mines in times of shortage on a weekly (corrected to a monthly) working-hour basis, the plan being designed to permit all mines to work practically the same number of full days during a month. The arrangement appears to be equitable, and is said to be satisfactory to both carrier and operators. All the mines on the lines of this carrier are located in Indiana.

Missouri Pacific Railway Company and St. Louis, Iron Mountain & Southern Railway Company.—These carriers have published rules governing the distribution of equipment for coal loading during periods of car shortage. The carriers give each mine a daily rating based on its capacity, and the record of the ratings are open to the inspection of mine operators. The ratings of mines having connection with other railroads are divided by the number of carriers serving them. All classes of equipment except closed cars, but including company fuel, private, and foreign-consigned cars, are counted against the mines receiving them. Orders for cars for company fuel loading are given preference over all other orders, i. e., cars are divided among all mines in proportion to their ratings *after* company coal orders are taken care of, although company coal cars are included in figuring the total distribution. If the number of company fuel,

private, and foreign-consigned cars delivered to a mine on a particular day, causes the mine's rating proportion of available cars to be exceeded, the average is charged against subsequent days' allotments.

Chicago, Milwaukee & St. Paul Railway Company.—The Chicago, Milwaukee & St. Paul Railway Company publishes no rules governing the distribution of coal cars. There are but six or seven mines on its lines in Illinois, including those of the St. Paul Coal Company (owned by the carrier), and it is stated that there is seldom any difficulty experienced in supplying all the cars needed. The plan of distribution is to permit all mines to work practically the same number of hours. Orders for cars for company coal loading are given preference over all other orders.

Illinois Central Railroad Company.—The Illinois Central is the largest coal carrying road in Illinois. There are on its lines in this state about 108 mines, located in 20 counties; these mines delivered to the carrier for shipment in the year ending June 30, 1911, over 15 per cent of the total shipments from all Illinois mines. Most of these mines are local to the Illinois Central, i. e., are served by no other carriers; several are junction point mines, i. e., served by other roads as well as the Illinois Central; and a few have outlets by water.

On June 1, 1911, the Illinois Central issued a circular embodying the rules which should apply in the rating of mines and the distribution of cars in accordance therewith. This circular was approved by a committee of operators and was in effect substantially all the time until January 2, 1913, when the rules were revised as a result of the Commission's opinion entitled "*In re Irregularities in Mine Ratings*," *supra*. Between February 9 and March 1, 1912, the carrier had in effect another circular in which it attempted to rate mines on the basis of tonnage shipped over its lines only. This plan was in accordance with the views of operators of local mines but contrary to the views of junction-point operators and was ordered canceled. As a result of the disagreement between the carrier and the operators, and the further disagreement between the operators themselves, the matter was brought before this Commission which ordered an investigation, the result of which was the opinion referred to above. In this opinion the Commission ruled that all mines on the Illinois Central should be rated on an hourly production basis. The Commission further expressed its opinion that on days when a junction-point mine ordered cars from no other carrier it was entitled to its full rating on the Illinois Central; on days when it ordered cars from one other road its rating should be 75 per cent of its full capacity, ascertained on the hourly production basis; and on days when it should order cars from two other roads its rating should be 50 per

cent of such capacity. It was in accordance with this opinion that the carrier issued its revised rulings effective January 2, 1913, to which reference has been made. The Commission is advised that as a result of operating under these revised rulings there has been little or no complaint by operators concerning the carrier's mine ratings.

Chicago, Rock Island & Pacific Railway Company.—There are about 10 mines on the lines of the Chicago, Rock Island & Pacific Railway Company in Illinois. These mines are not rated, nor does the carrier publish any rules governing the distribution of cars among them. The chief dispatcher has charge of this matter, and in times of car shortage distributes available cars among the mines in proportion to the number of cars loaded by each during the preceding thirty days, all cars (company fuel, private, and foreign-consigned included) being counted against the mines receiving them.

Chicago & Eastern Illinois Railroad Company.—The Chicago & Eastern Illinois Railroad Company has no published rules governing the distribution of cars among the several mines on its lines. The mines are given a daily rating, however, based on average monthly shipments, and cars are distributed with relation to the ratings. The records are open to all operators and disputes as to relative ratings are settled by hearings held by the carrier, at which operators are invited to express their views. All cars (including company fuel, private, and foreign consigned) furnished by the Chicago & Eastern Illinois, are counted against the mines receiving them. Cars for the Bunsen Coal Company at Westville, in the state of Illinois, are furnished by the Elgin, Joliet & Eastern (operating over the tracks of the Chicago & Eastern Illinois), hence are not included in the Chicago & Eastern Illinois distributions.

Cleveland, Cincinnati, Chicago & St. Louis Railway Company.—The Cleveland, Cincinnati, Chicago & St. Louis Railway Company has no published rules governing the distribution of coal cars among the several mines on its lines. It is stated that little difficulty has been experienced in the past in supplying all the cars required by operators; that heretofore the carrier has not counted company coal, foreign, and private cars against mine ratings, but in the event of a future car shortage it will be governed by this Commission's rules.

Vandalia Railroad Company.—The Vandalia Railroad Company has published rules of car distribution. The ratings of mines are determined by taking the average output of each mine on days in the calendar month when it received a full supply of cars and operated without interruption. Each mine in a district receives a rating proportion of available cars in that district. The total number of cars to be placed for loading company fuel is deducted from the available car supply and the remainder is distributed on the percentage basis. The rated capacity of each mine furnishing company fuel

coal is reduced by the tonnage furnished the carrier, to determine mine's pro rata share of available cars on the percentage basis. In other words, a mine furnishing the carrier with fuel gets all the cars it needs for that purpose; in addition, it gets its proportion of cars for other loading. This plan is not in accordance with the Commission's rulings. Private and foreign consigned cars delivered to a mine are counted against its rating. If the number of such cars delivered on a particular day exceeds the mine's pro rata share of available cars, it is entitled to no other cars. If, however, the number of such cars is less than the mine's pro rata share, the mine receives additional cars to make up its total share.

Chicago, Burlington & Quincy Railroad Company.—The Chicago, Burlington & Quincy Railroad Company publishes rules governing the ratings of mines and the distribution of cars in accordance therewith. Operators are expected to fix and agree upon these ratings among themselves, but, failing to do so, the carrier establishes the ratings by taking the average loading of each mine on the road for a period of ten consecutive days when the mine operated full time and received empty cars in full of its requirements; to this 20 per cent is added for expansion. All equipment available for coal loading (including company fuel, private, and foreign consigned cars) is counted against the mine receiving it.

Chicago & Alton Railroad Company.—The Chicago & Alton Railroad Company has published rules governing the distribution of cars during periods when the number of available cars is insufficient to meet all requirements. The established ratings of mines are on a tonnage-capacity basis. Operators are expected to fix and agree upon these ratings, but, failing to do so, the carrier establishes the ratings based on information at hand. A record of the ratings of all mines is kept in the carrier's office and is open to the inspection of all operators. Junction-point mines are rated according to the percentage that shipments over the Chicago & Alton bear to total shipments over all roads. This plan is not in accordance with the Commission's rulings. All equipment available for coal loading, including company fuel, private, and foreign-consigned cars, is divided among the various mines in accordance with their ratings. Company fuel, private, and foreign-consigned cars are placed at the mines to which they are billed, but are counted against the ratings of those mines.

The Wabash Railroad Company.—The Wabash Railroad Company has no published rules governing the distribution of coal cars among the mines on its lines. The mines are rated according to output and the ratings are revised from time to time as necessity demands. The plan of distribution in times of shortage is theoretically on the basis of such ratings. In actual practice, however, the plan is not strictly followed, and discretion in the matter seems to be left largely to division superintendents.

Litchfield & Madison Railway Company.—The Litchfield & Madison Railway Company has no fixed rules of car distribution, nor are the mines rated, but it is stated that no difficulty has been experienced in supplying all the cars required.

Southern Railway Company.—The mines on the lines of the Southern Railway in Illinois are rated according to commercial and physical capacity, and coal cars are distributed thereto in times of shortage according to these ratings after deducting the number of cars needed for company fuel loading. Foreign consigned and private cars are counted against the mine ratings. Officials of the carrier state that they have experienced comparatively little difficulty in supplying operators with the cars required.

Baltimore & Ohio Southwestern Railway Company.—The Baltimore & Ohio Southwestern Railway Company has established rules showing the method of rating mines and the plan of distribution of cars during periods when the car supply is insufficient to meet all requirements. Mine ratings for each operator are based on the highest average daily shipment of all the mines of such operator for one month during the extended period of full car supply next preceding the period of shortage. To this figure 10 per cent is added for expansion. All cars, except closed, but including company fuel, private, and foreign consigned, are counted against the mines receiving them. When the number of such cars delivered to a particular mine exceeds the percentage of available cars to which it is entitled, that mine is eliminated from the percentage plan for that day.

Elgin, Joliet & Eastern Railway Company.—There are eight mines on the lines of the Elgin, Joliet & Eastern Railway in Illinois, not counting six of the Bunsen Coal Company. The latter are located on the lines of the Chicago & Eastern Illinois, but the product from them is hauled by the Elgin, Joliet & Eastern under a trackage agreement. The carrier has no published rules governing the distribution of coal cars among the several mines on its lines. It is stated, however, that, owing to its location, the carrier is enabled to secure plenty of cars from other lines and has not suffered from a car shortage for several years.

Chicago, Peoria & St. Louis Railway Company.—The Chicago, Peoria & St. Louis Railway Company distributes available cars, during periods when the supply is not equal to the requirements, on a percentage plan based on the actual maximum output under normal conditions. All classes of cars are counted against the mines receiving them.

Toledo, Peoria & Western Railway Company.—The mines on the lines of the Toledo, Peoria & Western Railway Company in Illinois are rated according to output, and cars are distributed in times of

shortage on a percentage basis; all cars, including company fuel, private, and foreign consigned, being counted against the ratings.

Minneapolis & St. Louis Railway Company.—The Minneapolis & St. Louis Railway Company (formerly the Iowa Central) has no published rules governing the distribution of coal cars, nor have the mines on its lines ever been rated. The distribution is in the hands of the chief dispatcher of the division, who uses his judgment as to the equitable share to which each mine is entitled in times of shortage. All cars, including company fuel, private, and foreign consigned, are counted against the mines receiving them.

St. Louis & Belleville Electric Railway Company.—There are four mines located on the lines of the St. Louis & Belleville Electric Railway. The carrier has no fixed rules governing the distribution of cars and states that it has always been able to supply the full requirements.

East St. Louis & Suburban Railway Company.—There are two mines located on the lines of the East St. Louis & Suburban Railway. The method of car distribution between these mines is to provide one company with 45 per cent and the other 55 per cent of the available cars in time of shortage, based on the relative capacities of the mines.

Louisville & Nashville Railroad Company.—The Louisville & Nashville Railroad Company publishes no rules governing the distribution of coal cars in times of shortage. The mines on its lines in Illinois are rated according to their actual daily loading capacity, and all cars, including company fuel, private, and foreign consigned, are counted against the ratings.

SIXTH. THAT SAID COMMISSION BE ALSO REQUIRED TO REPORT AS TO WHAT REMEDY IT CAN SUGGEST TO CURE THE EVILS ABOVE SET FORTH, IF THEY EXIST.

SEVENTH. THAT SAID COMMISSION BE ALSO REQUIRED TO REPORT ANY FACTS OR CONCLUSIONS WHICH IT MAY THINK PERTINENT TO THE GENERAL INQUIRY ABOVE SET FORTH.

From the facts related herein, particularly those describing the industrial railways around St. Louis and those describing the relations of the New York Central lines to coal properties in Illinois (appendix), the Commission believes it important that the public business of transportation should be clearly separated from private business; that railroads should be prohibited from furnishing, directly or indirectly, capital or loans to private enterprises; that railroads should be prohibited from extending the use of their credit for the benefit of private individuals or companies; and that the commodities clause should be enforced and extended to all traffic.

APPENDIX.

NEW YORK CENTRAL LINES.

The first hearings held by the Commission to ascertain the relations of the New York Central lines with coal properties in Illinois left the record in so inconclusive and unsatisfactory a condition as to require the Commission to make an exhaustive investigation of its own through the medium of its examiners in the field. With the data thus secured further hearings were held and the carriers' officials were called as witnesses. Mr. T. J. O'Gara, the leading official of the O'Gara Coal Company, was also called, but on the advice of his counsel he declined to testify, claiming protection under the statute. Being in possession of the facts through the investigation of its examiners, the Commission was able at the later hearings to put of record much more information than was elicited at the earlier hearings. The testimony of several of the witnesses was characterized by evasions and lapses of memory and parts thereof were later withdrawn and corrected. In some instances a witness more than once asked permission to change his testimony; and in several cases the statements made by the same official at one hearing flatly contradicted what he had said at previous hearings. With respect to some phases of the transactions here mentioned, the record still affords no satisfactory explanation.

HARRISBURG COAL DISTRICT.

Coal from southern Illinois is said to be the best in quality in the state. The principal producing area in that section is in Saline county, commonly called the Harrisburg district, taking its name from the county seat. The district is traversed by the Cleveland, Cincinnati, Chicago & St. Louis Railway, commonly called the Big Four, and is also reached to a limited extent by the Illinois Central and Louisville & Nashville Railroads. Until 1905 only a few mines were in operation in that part of the state, and the output of coal for shipment amounted to but 15 to 30 cars a day. Owing to the poor railroad facilities and the high transportation rates, the markets were limited; shipments of coal originating on the Big Four could reach Chicago only in connection with a foreign line tapping a competing

field. In order further to develop the Harrisburg district and give the output a direct haul over their own rails to the Chicago market, the New York Central lines in 1905-1906 rebuilt the Cairo division of the Big Four and constructed a new line from Danville to Lake Michigan. The latter line was first called the Indiana Harbor Railroad, and now forms a part of the Chicago, Indiana & Southern Railroad, a constituent of the New York Central system. At this time the field produces for shipment from 300 to 500 cars of coal a day and is one of the most important coal districts in the state; the immense tonnage shipped therefrom has caused the Big Four to be classed as second among the coal carrying roads in Illinois.

BIG FOUR COAL LANDS.

Contemporaneously with the rebuilding of the Cairo division and the construction of the Indiana Harbor Railroad the Big Four began to acquire coal lands and mineral rights in Saline and Williamson counties. As related in the main part of this report (p. 13), that company, during the years 1905 to 1907, purchased approximately 23,000 acres of such lands. This policy was entered upon, as explained of record, partly for the purpose of protecting the future fuel supply of the New York Central lines and partly to secure to those lines a large additional tonnage. The plan originated with Mr. W. C. Brown while he was vice president in charge of the lines west of Buffalo, with headquarters at Chicago,¹ and until he was transferred to New York City, in 1906, he had general supervision and direction of the work and approved all purchases. Thereafter this supervision was exercised by Mr. Brown's successor in Chicago, C. E. Schaff.

To have immediate charge under him of the drilling tests, the securing of options, and the purchasing of lands Mr. Brown selected one S. W. McCune, whom he had known for nearly 25 years and in whom he had such implicit confidence that he declined to require a surety bond of him, saying that he would be "personally responsible for the property in his care." McCune was on the pay rolls of the Big Four and received a monthly salary. To assist McCune, Mr. Brown appointed Charles P. Hewitt, his own brother-in-law. Hewitt was first assigned to aid in making the drill tests on lands under observation, and he also received a monthly salary. Later he was detailed with others to the work of securing options by getting into direct contact with the owners of the lands. In undertaking this work a new arrangement was made with Hewitt—instead of a salary he was

¹ Mr. Brown later became president of the several companies comprising the New York Central system, which position he retained until Jan. 1, 1914, when he resigned. It is understood, however, that he is still a director of the Big Four, and possibly other New York Central lines.

to be compensated by a commission of \$5 per acre on the lands actually purchased. Hewitt had had no previous experience of any kind in coal lands or real estate transactions, and his experience in general business matters had been meager. The record shows that he at once became a tool in the hands of McCune, with whom he agreed to divide his commissions in return for certain services by McCune, the nature of which Hewitt was unable to explain and which McCune did not explain. McCune therefore, in addition to his salary, received commissions on lands purchased by the Big Four, and while Mr. Brown permitted the arrangement, he asserts he was not advised of its terms. Hewitt thereafter signed all vouchers and other papers as directed by McCune, but handled none of the railroad company's money used in consummating the purchases, nor did he handle even the money that he himself earned by way of commissions. Checks sent by the Big Four to Hewitt in payment of commissions he merely indorsed over to McCune. The latter deposited the amounts in his own bank account, then checked out Hewitt's share, one-half, and sent the funds to Mr. Brown, who in turn deposited them in a bank at Clarinda, Iowa, of which he is a stockholder, the cashier being his brother-in-law and also a brother-in-law of Mr. Hewitt. The share of commissions accruing to Hewitt from November, 1905, to April, 1906, amounting to \$12,581.30, appears as a credit to Mr. Brown's account at the Clarinda bank as of April 6, 1906, and to Hewitt's account as of April 26; thereafter Mr. Brown merely indorsed the checks sent him by McCune and deposited the amounts to Hewitt's credit direct. The total amount of Hewitt's earnings from this source in a little over a year was about \$25,000 and McCune's about the same. Both invested their funds in the stock of the Davenport Coal Company, hereinafter described, and became officers thereof while contemporaneously in the service of the Big Four.

Many irregularities took place in connection with the purchase of these coal properties, and both McCune and Hewitt, one an old acquaintance and the other a brother-in-law of Mr. Brown, profited substantially thereby. The irregularities were accomplished by the use, apparently as occasion or circumstance suggested, of one or more of the following devices: (1) By preparing vouchers for amounts in excess of those actually and eventually received by the grantors of the properties sold to the Big Four; (2) by taking lands in Hewitt's name and turning them over to the Big Four at advanced prices; and (3) by secreting the legitimate commissions in the purchase prices and then passing additional vouchers in favor of Hewitt as his alleged commissions on the same land. Hewitt definitely asserted that he was not aware of these acts. Funds so pilfered from the Big Four were handled in the same manner as were legitimate commissions, i. e., deposited in McCune's bank account and then

divided with Hewitt, the latter's share passing through Mr. Brown's hands to the bank at Clarinda. Mr. Brown asserts that he had no way of verifying the amounts sent to him by McCune, and they merely passed through his hands for Hewitt's convenience. Traveling auditors of the Big Four in 1909 checked over the vouchers and other papers in connection with these coal-land purchases, but failed to report the irregularities mentioned.

The record does not show that Mr. Brown had any knowledge of the irregularities in the purchase of these properties. The only charges that can be made against him in connection with the pilfering of the funds of the company of which he was an executive are that (1) he placed McCune, a personal acquaintance, without bond in a responsible position, involving the expenditure of over \$1,000,000, to which trust the record shows that person was unfaithful, and (2) he assigned to a lucrative position, netting nearly \$25,000 in a little over a year, a relative, who was not competent even to handle his own money affairs, was inexperienced in the work itself, and was lacking in the most ordinary business ability.

SALINE COUNTY COAL COMPANY.

The fact that certain officials of the New York Central system were active in the promotion and subsequent history of the Saline County Coal Company and the O'Gara Coal Company is indicated in the main part of this report. Two or three independent companies of minor importance operate mines in the Harrisburg district, but their combined output is comparatively small. The Saline County Coal Company was formed in 1907 as the successor of the Davenport Coal Company. The latter was incorporated in 1895, with a capital stock of \$25,000, a majority of which was owned or controlled by one John Davenport and his family. The Davenport Coal Company was the only mining concern of any importance in the Harrisburg district not taken over by the O'Gara Coal Company in 1905. W. C. Brown testified that early in the development of the Harrisburg district it became evident to him and C. E. Schaff that for the purpose of competition, and to insure a supply of coal for the New York Central lines at reasonable prices, it was necessary to get an operation of some magnitude in the Harrisburg district, in addition to the O'Gara Coal Company. Apparently these gentlemen selected the Davenport Coal Company as the nucleus for the new operation, as on May 3, 1905, Mr. Brown wrote—

I hope Davenport will hang onto his property there, as he certainly can make more in that way than he can by going into any deal.

He testified that his idea in writing that letter was to prevent Davenport from making any coalition with the O'Gara people or anyone

else. As a preliminary step toward the working out of the plan, S. W. McCune secured from John Davenport in February, 1906, a lease on approximately 851 acres of coal lands, the instrument containing a clause whereby McCune agreed to purchase a part of the stock of the Davenport Coal Company. He accordingly bought 125 shares, or a one-half interest in the company, the purchase representing the personal investments of himself, C. P. Hewitt, W. C. Brown, and C. E. Schaff, in about equal proportions, the stock of the two latter gentlemen being taken in the name of McCune. Hewitt's original investment in Davenport Coal Company stock was \$14,021.70, paid over in the form of a check in favor of S. W. McCune. This amount was charged to Hewitt's account at the Clarinda bank on April 26, 1906, and the same amount appears in Mr. Brown's account as of April 6, with the notation "C. P. Hewitt to S. W. McCune." Subsequent purchases of Davenport stock by Hewitt were made by checks payable to Mr. Brown. These checks were written by Mr. Brown, although signed by Hewitt. The capital stock of the Davenport company was increased in June, 1906, to \$200,000, the stockholders receiving six shares of new stock in exchange for each one of old. In April, 1907, the Pierce family, of Kewanee, in the state of Illinois, one of the members of which is Mr. Brown's son-in-law, bought the half interest in the Davenport Coal Company owned by the Davenport family, and the capital stock was again increased, this time to \$250,000, the increase being equally divided between Mr. Brown and C. I. Pierce. The Saline County Coal Company was then formed, and it took over the property of the Davenport Coal Company, the stockholders of the latter receiving bonds and bonus stock in the new company in exchange for their Davenport stock, as follows:

	Holdings in Davenport Co.	Saline County Coal Co. bonds exchanged for Davenport stock.			Saline County Coal Co. stock given as a bonus with the bonds.	
		Bonds.	Bonus bonds.	Total.	Common.	Pre- ferred.
Pierce family.....	\$125,000	\$125,000	\$12,500	\$137,500	\$150,000	\$24,375
W. C. Brown.....	45,000	45,000	12,500	57,500	51,000	13,625
C. E. Schaff.....	53,500	80,000	25,000	35,000	33,000	9,000
S. W. McCune.....				35,000	33,000	9,000
C. P. Hewitt.....	26,500			35,000	33,000	9,000
Total.....	250,000	250,000	50,000	300,000	300,000	75,000

¹ Taken in Hewitt's name

² Taken in McCune's name.

So far as can be learned, the aggregate cash investments of Mr. Brown, Mr. Schaff, Mr. McCune, and Mr. Hewitt in Davenport Coal Company stock were less than \$75,000; the par value of Saline County Coal Company securities they received in exchange therefor was

\$353,125. It does not appear of record what the remainder of the securities actually cost the Pierces.

In the 1910 hearings in these proceedings it was testified that Mr. Brown's holdings of Saline County Coal Company bonds were \$91,000. In the 1912 hearings Mr. Brown testified that he originally owned between \$90,000 and \$100,000 worth of bonds, and was one of the principal bondholders; that he at one time owned considerable stock but subsequently exchanged it all for bonds (with the exception of 100 shares of preferred which he gave to his daughter), his reason being that he did not want any part in the management of the company. In a letter of November 6, 1912, Mr. Brown informed the Commission that his original holdings of bonds were \$66,000 and of stock \$76,600. In a hearing before the Commission on May 3, 1913, Mr. Brown testified that his letter of November 6 had been written from memory, and he corrected the information therein given by submitting an exhibit purporting to show the organization of the Saline County Coal Company and the distribution of bonds and the accompanying stock. This exhibit shows his original holdings as indicated in the above table. Mr. Brown originally testified that he had bought his Saline company bonds for cash, paying 90 for them and receiving proportions of common and preferred stock as bonuses, as did other subscribers. This statement was retracted later by Mr. Brown's attorney, who wrote that Mr. Brown had confused this transaction with a purchase of bonds in another company. Mr. Brown had disposed of his securities in this company until at the time he testified he held but \$44,000 worth of bonds and no stock; up to that time he had made a profit on his transactions of approximately \$16,000. In addition to his other holdings, Mr. Brown has held Saline County Coal Company bonds as collateral for notes of Mr. Hewitt, but states that he had no further interest in such bonds and has now disposed of both notes and collateral. When the bonded indebtedness of the Saline County Coal Company was increased Mr. Brown purchased \$50,000 worth of bonds and received 85 per cent of common and 20 per cent of preferred stock as bonuses; these securities he presented to his daughter upon her marriage to George S. Patterson, now vice president of the coal company. Mr. Patterson also received a similar amount of these securities as a present from his father. Mr. Schaff exchanged all his stock for all of McCune's bonds; Mr. Schaff is no longer connected with the New York Central system, and his present interest in the Saline County Coal Company does not appear of record. At the time of the hearing Mr. McCune owned \$84,000 worth of stock and Mr. Hewitt \$28,000 of bonds of the company. It would therefore appear that notwithstanding the fact that Mr. Brown's present holdings of the Saline County Coal Company securities are comparatively

small, he has been from the first intimately associated with the company through the medium of relatives and friends.

O'GARA COAL COMPANY.

Mr. W. C. Brown and other officials of the New York Central system took an active part in the promotion of the O'Gara Coal Company, although most of these gentlemen have since disposed of their holdings of the stock and bonds of that enterprise. When T. J. O'Gara desired to finance a company to purchase and develop the coal properties in Illinois which he held under options, he approached Mr. Brown and gave the latter 15 days in which to raise funds for the purpose. Mr. Brown succeeded in interesting James Kerr and J. B. Russell, eastern capitalists, and the coal company was thereupon formed as described in the main part of this report. Kerr and Russell underwrote \$1,000,000 of the first issue of bonds, and Mr. Brown underwrote the remaining \$500,000. The underwriters paid \$900 for each \$1,000 bond and received with each bond \$900 in common stock of the company and \$300 in preferred stock. In addition, Mr. Brown received for his services in promoting the enterprise \$50,000 of common and \$100,000 of preferred stock. Mr. Brown disposed of all except \$62,500 of the bonds underwritten by him by selling them to officials of the New York Central lines and others without profit to himself. He let them have the bonds, with the proportional amount of common and preferred stock, on the exact basis of his underwriting. Of the \$62,500, he sold \$50,000, and the accompanying bonus stock of \$60,000, together with the \$150,000 of stock received for his services, to Kerr & Russell, and received therefor \$25,000 in stock of the National Corporation Securities Company \$30,000 in cash and a release from the balance, about \$36,000, of his subscription obligation. Later he became dissatisfied with his stock in the National Corporation Securities Company and exchanged it for a like amount, \$25,000, of bonds of the O'Gara Coal Company. These bonds Mr. Brown disposed of during 1906, but was unable to state the details of the transaction. There remained in Mr. Brown's possession 12 bonds of the face value of \$12,000, with the accompanying bonus stock, an adjustment having been made to cover the balance \$500, there being no bonds of that denomination. Mr. Brown sold five of these bonds to his brother, two to a Mr. Winton, two were retired under the sinking-fund provision of the coal company's mortgage, and three Mr. Brown can not account for. In whose name his O'Gara Coal Company stock was issued Mr. Brown was unable to state. He testified, however, that all stock and bonds of the O'Gara Coal Company which he formerly held, passed out of his hands during 1906, and that since that time he has had no direct or indirect financial interest in the coal company.

E. T. Glennon, vice president and general counsel of the roads of the New York Central system, west of Buffalo, subscribed for \$87,500 of the bonds underwritten by Mr. Brown, and testified that he bought them as an individual and not as an officer of the carriers and because he thought the purchase a good speculation. Mr. Glennon first testified that he received with his bonds 30 per cent of preferred stock and only 20 per cent of the common stock. Later he corrected this statement and said that he had received, by way of bonus with the bonds, 30 per cent of preferred stock and 90 per cent of common stock. Within a year from the time he purchased these securities, Mr. Glennon sold them at a profit of approximately \$15,000. In addition to the bonus stock accompanying the bonds, Mr. Glennon received for his services in the organization and promotion of the enterprise 500 shares of preferred stock and 543 shares of common stock. This stock he still owned at the time he testified, although it stood in the name of Thomas J. O'Gara.

C. F. Daly, vice president in charge of traffic of the several New York Central lines, subscribed for \$25,000 of the bonds underwritten by Mr. Brown. He testified that the investment was made in his own interest and at the suggestion of Mr. Brown. Some of Mr. Daly's bonds were retired by the coal company under the sinking-fund provision of the mortgage; the balance was held by him for four or five years and was finally sold at less than cost. He kept his stock until the latter part of 1909, when he delivered it to his brother-in-law, Mr. Gordon, for services rendered. Mr. Gordon was connected with the Lesan Advertising Agency, which handled a large part of the advertising work of the New York Central lines. Mr. Daly testified that all his holdings of securities of the O'Gara Coal Company were disposed of prior to December, 1909, and that he has at present no financial interest, direct or indirect, in that company.

Other New York Central officials who subscribed for a part of the bonds underwritten by Mr. Brown were C. E. Schaff, \$25,000; J. F. Deems, \$25,000; E. T. Henson, \$10,000; G. F. Grammer, \$25,000; and W. C. Bower, \$10,000. Mr. Schaff, Mr. Deems, and Mr. Henson are no longer connected with that railway system, and Mr. Grammer is deceased. It does not appear of record what disposition was made of their securities. The same is true of the securities subscribed for by Mr. Bower.

John Carstensen, vice president in charge of accounting of the several New York Central lines, states that he took an active part in the formation of the O'Gara Coal Company as a means of developing traffic on the New York Central lines, but that his investment was personal and not as an official of the carriers. He entered into the arrangement with the hope that the investment would ultimately

prove profitable, but claims to have been disappointed in that respect. Mr. Carstensen subscribed for \$100,000 of bonds of the O'Gara Coal Company; this was independent of Mr. Brown's underwriting, being one-half of a subscription made in the name of James Kerr. Mr. Carstensen first testified that he had received preferred and common stock as bonuses in the same proportions as had Mr. Brown; upon looking up his records, however, he discovered that while he had received the same proportion of preferred, he had not at the time received the same proportion of common; subsequently in a settlement with the Kerr estate he secured what was apparently the equivalent. In addition he received for his services preferred stock, the amount of which according to his original testimony was \$60,000. Some of Mr. Carstensen's original testimony is interesting in the light of that subsequently given by him. He first testified in part as follows:

Q. Do you own any bonds at the present time?—A. No.

Q. You disposed of your bonds in 1906?—A. Yes.

Q. What disposition did you make of your stock?—A. That went with the bonds.

Q. Is any member of your immediate family a stockholder or bondholder in these companies?—A. No.

At a later hearing Mr. Carstensen testified as follows:

A. * * * In addition to the participation in the underwriting as above described, I received \$95,000 par value of the preferred stock of the O'Gara Coal Company in consideration for services rendered by me in connection with the organization of the stock and securing subscriptions to its bonds. This stock, as I recall, stood in the name of T. J. O'Gara and was given by me to Mrs. Carstensen at the time it was received. This stock was also transferred into the name of Arthur L. Linn, Jr. It was subsequently transferred from Mr. Linn's name into that of Mr. O'Gara for the same reason as above stated. I have made no profit on any of these transactions.

Q. That \$95,000 of preferred stock is now owned by Mrs. Carstensen, is it not?—A. Yes, sir.

Q. * * * That figure of \$60,000 is incorrect?—A. It is incorrect.

Q. It should be \$95,000?—A. Yes, sir.

It would therefore appear from the record that with but two exceptions New York Central officials had no financial interest in the securities of the O'Gara Coal Company at the time they testified. It is worthy of mention, however, that the coal company has been granted a great many unusual concessions, and from the time it began shipping coal to within the last year it has been a preferred institution on the New York Central lines. In fact, the carriers have practically supported the coal company for years. In September, 1913, the O'Gara Coal Company went into the hands of friendly receivers, the investigations of the Commission having caused the New York Central lines to restrict their support of the coal company. There follow brief descriptions of several of the evidences of preference

shown by the New York Central lines to the O'Gara Coal Company prior to the receivership.

Indebtedness of O'Gara Coal Company.—In September, 1910, the O'Gara Coal Company owed the New York Central lines nearly a half million dollars on account of old freight charges and advances. For five months previous to the date mentioned the mines had been closed on account of a strike of miners and no shipping had been done; therefore, this amount included no current freight charges.

Advances by New York Central lines to O'Gara Coal Company.—In 1909 the O'Gara Coal Company submitted to Mr. Carstensen, vice president of the several New York Central lines, a statement purporting to show \$32,000 worth of unpaid claims due to it. On the strength of this statement Mr. Carstensen ordered the Big Four to advance \$20,000 to the coal company, although the carrier's records showed but \$8,000 of valid claims due. Against this advance were applied vouchers in settlement of prior and subsequent claims allowed, and the amount was finally offset in 1911. In effect, therefore, the Big Four in 1909 paid claims relating to shipments moving in 1910 and 1911.

In August, 1910, the Big Four loaned to the O'Gara Coal Company \$225,000 on the latter's one-year note, secured by all the stock and two-thirds of the bonds of the Harrisburg Big Muddy Coal Company, a subsidiary of the O'Gara Company. At expiration in 1911 a new note for the same amount and similarly secured was made. In 1912 the carrier began reducing the face of the note by applying amounts deducted from vouchers due the coal company for coal purchased. When the second note matured in August, 1912, a new one-year note for the unpaid balance, and similarly secured, was made, maturing in August, 1913. By the time this third note matured the indebtedness had decreased to approximately \$170,000, but the carrier did not secure a new note for this amount and for some reason did not foreclose on the collateral. One month later, September, 1913, the O'Gara Coal Company and the Harrisburg Big Muddy Coal Company went into the hands of receivers, and the latest advices in possession of the Commission indicate that there is still due the Big Four approximately \$170,000.

In 1910 the Lake Shore & Michigan Southern advanced to the O'Gara Coal Company \$50,000 on the latter's notes, secured by one-third of the bonds of the Harrisburg Big Muddy Coal Company. The carrier later collected the amount by deductions from vouchers in payment of fuel coal purchased, closing the account during 1911.

In 1912 the Big Four advanced \$9,000 to the O'Gara Coal Company as advance payments on claims and fuel coal purchased, and later collected the amount by applying against the indebtedness amounts of vouchers payable to the coal company.

in April, 1913, one bill containing several years' interest was made, but unless settled since the Commission's latest advices is not yet paid. Surety bonds to the amount of \$100,000 secured the Chicago, Indiana & Southern. Until September, 1912, the Big Four was secured by a bond of only \$30,000, which amount was later increased to \$100,000. The result of this arrangement was that the coal company continually had the use of large sums of railroad money at slight expense. The amount of this indebtedness varied between summer and winter, but an idea of the amount due during the winter months may be gained from the statement that on December 15, 1912, the coal company owed the Chicago, Indiana & Southern \$141,283.43 and the Big Four \$218,580.29, which amounts, it will be noted, greatly exceed the amounts of the security furnished. In June, 1913, the carriers reduced the credit to 45 days. On August 1 about \$140,000 in freight charges was due the carriers, and this amount was at last accounts still outstanding, owing to the receivership of the coal company, the surety company not having made good the loss.

Protection of O'Gara contracts by carrier.—The Commission's investigation developed several instances in which the O'Gara Coal Company's customers who were temporarily short of coal were supplied by the railroad company, the latter making proper settlement with the coal company. The reason ascribed by the carriers' superintendents was the protection of the O'Gara Coal Company contracts.

Solicitation of business for O'Gara Coal Company by railroad officials.—The record discloses letters written by Mr. Brown to officials of other railroads and industries soliciting their coal business for the O'Gara Coal Company and in a few instances for the Saline County Coal Company. Mr. Brown testified that these letters were written purely from a traffic standpoint to help secure tonnage for the Big Four. The letters, however, were marked "Letters written by W. C. Brown in behalf of the O'Gara Coal Co." So far as can be learned no such effort has ever been made to secure business for any other coal company, either in the Harrisburg district or elsewhere on the New York Central system.

Additional price paid for storage coal.—Early in 1910, in anticipation of the strike of miners in the Harrisburg district, the New York Central lines stored at Harrisburg 66,649 tons of coal, for which the regular contract price was paid. Of this tonnage 60,657 tons were bought of the O'Gara Coal Company. In July, 1910, Mr. Carstensen, vice president, on authority of Mr. Brown, president, issued instructions that the Coal Company be paid 35 cents per ton extra on this storage coal, giving as a reason that the coal company had been "prevented by the railroad company from selling the coal to others at a price higher than the regular contract price to the railroad company." Accordingly, vouchers for \$21,230.02 were passed in favor

of the coal company. This payment assumes the aspect of a pure donation and was made in cash, notwithstanding the fact that the coal company was heavily in debt to the carriers at the time.

Prices paid by carriers for fuel coal.—After the 1910 strike, conflict arose between the New York Central lines and the O'Gara Coal Company as to the price to be paid for coal. The latter insisted on an increase of 20 cents per ton over the 1909 contract and so billed its coal; the carrier, however, paid the 1909 price until March, 1911, when a compromise was effected, the result being an increase of 12½ cents over the 1909 price. Approximately \$102,000 was paid the coal company in this adjustment. The 1911 price, however, was but 5 cents per ton over that of 1909. It is worthy of mention that during the period (1910–11) when the carrier was paying a high price for its coal, the coal company was selling the same size of coal to another railroad company for a much less price; furthermore the carriers' records show that it could have bought the same size coal on its lines in a near-by county for 17½ cents less than it paid the O'Gara Coal Company.

Use of false point of origin on Big Four billing.—Some of the O'Gara Coal Company's mines are located at Eldorado, 8 miles north of Harrisburg. The product of the mines at Harrisburg has a better trade reputation and is more in demand than that produced by the mines farther north in the district. For the purpose of concealing from customers the fact that their orders were being filled with Eldorado coal, the O'Gara Coal Company prevailed upon the Big Four to bill O'Gara's Eldorado shipments in such form as to indicate to the consignees of such shipments that the coal had come from Harrisburg. It is significant that the Big Four discontinued this practice immediately upon learning that the Commission was aware of it. This matter was referred to the Department of Justice, with the result that indictments were returned against the carrier for granting a discrimination in violation of the Elkins Act. The Big Four recently pleaded *nolo contendere* to this charge and paid a fine of \$3,000.

Unlawful application of divisions of through rates.—One of the O'Gara Coal Company's largest customers was the Grand Trunk Western Railway, but to secure its business the coal company was obliged to make low prices in order to compete with operators on the Illinois Central and Chicago & Eastern Illinois, who could ship on lower freight rates. Although the coal was sold f. o. b. Grand Trunk junctions, the O'Gara Coal Company, in order to meet competition, billed this coal to fictitious destinations beyond these points, and prepaid the freight at the New York Central lines divisions of the through rates, instead of at the local rates to the junction points where the coal was actually used. The coal company, with the

collusion of the carriers, thus succeeded in defeating the lawful rates to the actual destinations by 10 and 13 cents per ton. The matter was referred to the Department of Justice, with the result that indictments were returned against all the parties at interest. Recently the Big Four and Chicago, Indiana & Southern pleaded *nolo contendere* to these charges and were assessed fines aggregating \$12,000. The O'Gara Coal Company entered the same plea and was assessed fines aggregating \$5,000; the Grand Trunk also pleaded *nolo contendere* and was fined \$5,000.

Rebate of \$60,000 to O'Gara Coal Company.—The Lake Shore & Michigan Southern Railway in 1909 issued in favor of the O'Gara Coal Company seven vouchers aggregating \$60,000, and concealed the payments on its books by charging them to a large suspense account. These payments were made on the authority of R. M. Huddleston, then auditor of the Lake Shore, but now general auditor of the New York Central lines west of Buffalo, and purported to be for advance payments on coal, invoices for which had not been received. Mr. Huddleston testified that he acted on his own authority and without the knowledge of his superiors. Mr. Carstensen, vice president, in charge of accounts, testified he had never heard of the payments until brought to his attention by the Commission. Data in the hands of the Commission, however, shows that Mr. Carstensen's attention was directed to the payments less than a year after they were made. The vouchers covering these payments were not supported by any papers whatever, and it is apparent that all details of the transaction were destroyed or skillfully concealed. Upon being pressed for documents in support of the payments, Mr. Huddleston produced 45 carbon copies of O'Gara Coal Company invoices against the Lake Shore, covering the value of 1,250 cars of coal, and aggregating, according to an adding machine slip attached, \$60,000. It developed, however, that these invoices had been gathered for the mere purpose of giving the appearance of support to the payments and in reality had no connection with them; in fact, the extensions of some of them had been changed in order to make the aggregate an even \$60,000. Mr. Huddleston denied under oath any knowledge of the source of these invoices, how or for what purpose they were prepared, how they came to be in his desk, who put them there, or how long they had been there.

Mr. Huddleston first testified that these payments were in settlement of a controversy with the O'Gara Coal Company concerning the loss of some 400 cars of coal in 1905 and 1906. The Commission's investigation developed that some confusion did actually exist at that time, but that settlement for all shipments had been made before the end of 1907. Confronted with proof to this effect, Mr. Huddleston retained personal counsel on whose advice he retracted

most of his previous testimony, and explained the payments as covering the value of coal in the possession of the New York Central lines between the bill of lading date and the time, a few days later, when the coal company received its money. His first testimony was to the effect that the amount would eventually be repaid to the Lake Shore by other system lines, but he retracted this and testified that the O'Gara Coal Company owed the Lake Shore the amount, although he admitted that he had never asked the coal company for payment and had never included the amount in a statement against it. The O'Gara Coal Company denied the indebtedness to the Lake Shore, but declined to submit its books even under subpoena, declaring that all its records are destroyed within a year or two after their use. This statement is improbable, to say the least. The New York Central lines permitted the record relating to this transaction to remain in this unsatisfactory shape, and it became necessary to refer the matter to the Department of Justice with the result that indictments were returned against three of the New York Central lines, the coal company, and certain individuals.

It appears that in October, 1913, the Lake Shore deducted this \$60,000, plus 4 years' interest, from vouchers payable to the coal company for fuel coal purchased. The coal company had assigned its invoices to a Chicago bank, so that in reality not the coal company but the bank has paid the amount, although the Lake Shore books have been relieved.

It has been shown elsewhere that W. C. Brown has been associated constantly with the Saline County Coal Company since its inception, and, in fact, was one of the promotors thereof. It should be stated, however, that the Commission has discovered no evidences of favoritism on the part of the New York Central Lines toward that company. The O'Gara Coal Company, on the other hand, was extended many preferences and, as already related, was practically supported by the carriers for years. Many of the concessions described above were skillfully concealed, and some were discovered almost by accident. The attempts of Mr. Brown and others of the carriers' officials to explain the concessions leave much to be desired. In short, they amount to ignorance of the rebates mentioned, while as to loans, advances, and extensions of credit Mr. Brown and his associates admit knowledge of the practices but claim to have been actuated by a desire to protect the fuel supply and the traffic of their lines by protecting a patron from the financial disaster that would otherwise occur. It is significant, in this connection, that among the hundreds of industries along the 13,000 miles of New York Central lines' tracks the carriers should have overlooked all moribund concerns except one of those in which the carriers' officials were interested. Be that as it may, certain it is that among minor officials

the impression has always prevailed that their superiors were in some manner interested in the O'Gara Coal Company, and that the latter was in reality a New York Central property. This no doubt has caused in the minds of these minor officials the idea of favoring the coal company even in the absence of specific instructions from superiors. The fact is, and this is fully shown of record, that the connection of some of the high officials of the New York Central lines with these coal properties resulted in no small demoralization in the service and led to a belief on the part of minor officials that in permitting these abuses to go on they were promoting the interests of their superior officers. Whether this explains Mr. Huddleston's course is not clear from the record. We see no other possible explanation, so far as minor officials and employees are concerned, respecting some of the abuses hereinabove described. In any event, neither W. C. Brown nor his associates can escape severe criticism for permitting these practices to exist. The Commission deems as significant the attitude of Mr. Brown and Mr. Carstensen in the matter of the payment to the O'Gara Coal Company of the \$60,000 rebate described elsewhere. In testifying before the Commission Mr. Huddleston, the general auditor, took upon himself the entire responsibility of that transaction, and asserted that his superiors did not authorize or even have knowledge of the payments. Mr. Brown and Mr. Carstensen specifically denied any knowledge of the \$60,000 rebate and appeared shocked that such conditions should prevail in their organization. A singular phase of the situation is that no one connected with the New York Central lines except Mr. Huddleston pretended that he had authority to make such a payment. Both Mr. Brown and Mr. Carstensen specifically denied that Mr. Huddleston's powers embraced any such discretion. Yet, although misapplication of company funds is usually punishable at least by dismissal, Mr. Huddleston has been retained in his position for over a year since the Commission first brought the matter to the attention of the New York Central officials. Neither Mr. Huddleston's testimony nor his demeanor on the witness stand was satisfactory, and his statements can be accepted only with reservations.

TENTATIVE PLANS OF CONSOLIDATION.

On various occasions the New York Central officials have had under consideration plans for the consolidation of all the coal properties in the Harrisburg district associated with the New York Central lines. Briefly, the plan contemplated that the Chicago & Harrisburg Coal Company, owned by the Big Four, would issue bonds guaranteed by the Big Four and purchase from the latter its coal lands and from the Saline County Coal Company and O'Gara Coal Company their mines and lands. There was then to be formed an

operating company, to which the mines and part of the lands would be leased for operation.

W. C. Brown and other officials testified that the plan never received serious consideration and in all probability would never be effected. It is worthy of mention, on the other hand, that in the latter part of 1913 the capital stock of the Chicago & Harrisburg Coal Company was increased from \$55,000 to \$1,500,000, and that company began taking over the coal lands owned by its parent company, the Big Four Railway. Whether this is the beginning of a gigantic coal proposition involving the purchase of the Saline and O'Gara properties, and based on the credit of the New York Central lines, the record does not disclose. Such a use of railroad credit for the private ends of favored individuals should obviously receive, if carried out, the severest condemnation of the law.



veyed to the Government of the United States an invitation to be represented by delegates in the international conference on social insurance to be held at Paris, from September 21 to 24, 1914. Previous to the receipt of this invitation the Secretary of Labor, in a letter dated June 13, 1914, called my attention to the importance of the congress and to the necessity for participation therein by the Government of the United States. In recommending that an application be made to Congress for the necessary authority to accept the invitation extended by the Government of the French Republic, the Secretary of Labor states that the next international congress on social insurance is to be held in the city of Washington, in September, 1915, and that if the Government of the United States expects the representatives of foreign Governments to participate in the congress in Washington it would be discourteous to ignore the invitation of the French Government to attend the international conference to be held at Paris during the present year.

The Executive being prohibited by a provision of the deficiency act approved March 4, 1913, from accepting any invitation of this nature without specific authority of law, I have the honor to submit the papers herewith, to the end that should you approve they may be transmitted to Congress for that body to determine whether it will authorize the acceptance of the invitation.

Respectfully submitted.

WILLIAM PHILLIPS,
Acting Secretary of State.

DEPARTMENT OF STATE,
Washington, July 24, 1914.

[Translation.]

EMBASSY OF THE FRENCH REPUBLIC,
Manchester, Mass., July 7, 1914.

MR. SECRETARY OF STATE: My Government informs me that the International Permanent Committee on Social Insurance, of which the President of the French Republic is honorary president, will convene its members from the 21st to the 24th of September next in an international conference of social insurance which will be in the nature of a jubilee; the committee celebrating at that time its twenty-fifth anniversary.

On the request of Mr. Leon Bourgeois, senator, president of that international association, and in accord with the minister of labor and social providence, Mr. Viviani wishes me to call your excellency's attention to the contemplated meeting, and to make known to you the value the permanent committee would attach to having official delegates of the United States attend the conference.

Your excellency will please find herewith two copies of the program of the contemplated meeting.

Be pleased to accept, Mr. Secretary of State, the assurances of my high consideration.

R. CLAUSSE.

The Hon. W. J. BRYAN,
Secretary of State.

DEPARTMENT OF LABOR,
Washington, June 13, 1914.

SIR: The international conference on social insurance to be held in Paris September 21-24, 1914, is of such great importance that I venture to call it to your attention once more.

The next international congress on social insurance is to be held in the city of Washington in September, 1915. The Commissioner of Labor Statistics has been chosen chairman of the program committee for this international congress. The commissioner's duties as chairman of the program committee make it necessary that he should attend the conference on social insurance in Paris next September. All important European countries will be represented by official delegates. It is desirable that the United States should also be represented. If the United States Government expects the representatives of foreign Governments to participate in the congress in Washington in 1915 upon its invitation, it would be a discourtesy to ignore the invitation of the French Government to attend the international conference to be held in Paris during the present year. It would seem incongruous for the United States Commissioner of Labor Statistics to attend the international conference on social insurance as a private individual having no official status, especially as he is charged with important duties in organizing and carrying through the international congress on social insurance.

I inclose a copy of the official invitation issued by the French Government at the instance of the International Permanent Committee on Social Insurance. I respectfully ask that the necessary steps be taken for the acceptance of this invitation.

Respectfully,

W. B. WILSON, *Secretary.*

The SECRETARY OF STATE,
Washington, D. C.

INTERNATIONAL CONFERENCE OF SOCIAL INSURANCE, PARIS, SEPTEMBER 21-24, 1914.

INTERNATIONAL ASSOCIATION FOR SOCIAL INSURANCE,
COMITÉ PERMANENT INTERNATIONAL DES ASSURANCES SOCIALES,
February 15, 1914.

DEAR SIR: A Fourth International Conference of Social Insurance, following our international Congresses of Paris, in 1889, of Berne, in 1891, of Milan, in 1894, of Brussels, in 1897, of Paris, in 1900, of Düsseldorf, in 1902, of Vienne, in 1905, of Rome, in 1908, and the Conferences of the Hague, in 1910, of Dresden, in 1911, and of Zürich, in 1912, will take place in Paris the 21-24 of next September in the Receptionhalls of the Sorbonne (Université de Paris) under the Presidency of M. Léon Bourgeois, President of the Permanent International Committee, assisted by the Vice-presidents, MM. von Mayr, Ferrero di Cambiano, Lindstedt, Henderson and M. Ribot, President of the French Committee. The Governments of the different Countries have been invited to be represented by official delegates.

We have the honor to beg you to kindly take part in it, and also are communicating to you the first program of information of its organization and order of the day.

PRACTICAL OBSERVATIONS.

This Conference will be open to all the members of our International Association. To take part in it, it suffices, therefore, to become for 1914 a member of the Association.¹

The date of the Conference has been set in accordance with the dates of the other large associations which will hold their Conferences or committee reunions in September and which count among their members a certain number of our colleagues, and we believe that the journeys will be facilitated by the fact that the reunions will be held in the following order:

Conference of Tuberculosis, 10-12 September (Berne); Conference of Legal Protection, 14-16 September (Berne); Permanent Committee of the Association against unemployment, 18-19 September (Paris); Conference of Social Insurance, 21-24 September (Paris).

It should be mentioned in particular that the reunion of the Committee of Unemployment, likewise presided over by M. Léon Bourgeois, will be combined as to its practical organization with the Conference of Social Insurance, and we hope that those of the members of the Committee who are not at the same time members of our Association would be willing to prolong their stay to permit us to give them a hearty welcome.

In general, the members of the French Committee are welcoming in advance their Colleagues, notably those from abroad; they will endeavor to facilitate matters for them² and to render their stay agreeable without causing the Conference to lose any of that intimate and industrious character which our International Associations have decided to give to their reunions.

We should be very grateful to our old colleagues and to the new members who will be attracted by their announcement of the Conference, if they should notify us as early as possible as to their intention to be present in Paris in September, in order that we may mail to them subsequently all kinds of information and cards of admission.

THE PERMANENT COMMITTEE AND ITS JUBILEE.

The Conference of Paris will have a kind of a jubilee character. In fact this year it will be twenty five years since the "Permanent Committee of international Congresses of Industrial Accidents," which later became the "Permanent International Committee of Social Insurance" has been founded.

This Committee—we call the attention especially of those persons who have not as yet become members of it—always had and has for its general aims, as its name indicates, the study of Social Insurance

¹ Requests concerning membership and fees for 1914 (15 francs, giving the right to membership and all the publications of 1914) should be addressed to the General Secretary, Prof. Edouard Fuster, 4, rue du Moulin-Vert, Paris, XIV^e.

² Reductions of rates on French railway lines will, in accordance to the custom, be asked from the companies.

and the propaganda to encourage its extension throughout the whole world.

Therefore (in accordance with the two large analogous Associations, the "Legal Protection" and the "Struggle against Unemployment," the latter also presided over by M. Léon Bourgeois), the Committee of Social Insurance will endeavour to make better known in all "new Countries" the European Institutions of Social Safeguard, and to develop the regime of International Conventions of Labor.

Its European work is meanwhile being pursued. The Committee through its various organs is continuing to give information to the Governments and to form a public opinion; and one must recognize that its work has remained throughout the course of this quarter of a Century, as characterized as in the beginning by the happy combination of two qualities: Impartiality and Prudence.

These Congresses for instance have largely contributed to the conciliation of the two adverse systems of Social Providence (prevoyance): Compulsory Insurance, and Voluntary Insurance with State subsidies, and to the two great apparently contradictory needs: the generalization of an efficacious protection against the professional risks and the necessity of avoiding too heavy charges to the working man, to the industry and to the State.

The Association works principally through its publications and meetings. The "Bulletin of Social Insurance," edited under the direction of M. Fuster, keeps the members informed as to the legislation, the statistics and the facts in relation to social insurance against accidents, sickness, invalidity, old age, premature death, and unemployment. It is there that one can find all the laws in force as well as the official statistics.

Eleven Congresses and Conferences have already been called which gathered for more and more practical discussions the specialists of about twenty countries, numbering together more than a thousand, grouped in this Association.

Lastly, the National Committees of about fifteen countries are preparing international inquiries and are exercising a strong national influence.

THE GENERAL PROGRAM OF THE CONFERENCE.

The Conference of Paris thus having a jubilous character, it seems a good opportunity to hastily summarize the systems in force, their financial effects and their new orientation. Several of the discussions will be sustained by the reports of the Committees on the five inquiries which are actually in preparation. As to other aspects, the reports presented will call attention to new problems which the subsequent reunions will, doubtless, be called upon to treat more in detail.

I. What are the "charges" imposed upon the workingman's, industrial, national budget by the institutions of Social Providence, so liberally instituted during the past twenty five years? The Conference will seek to find how these charges can be estimated by subsequent inquiries, and will doubtless bring to notice already some interesting figures.

In connection with that principal question the Committee will provoke observations on one of the most difficult problems: What financial scheme must be selected in insuring against invalidity?

Furthermore—the importance of this question ought not to escape us—the Conference is called upon to study if it is already possible to foresee an international standardization by means of Conventions of Social Insurance, of those charges which have already been accepted under nearly identical conditions by a large number of Countries?

II. In the above first series there will, on the whole, be no question but of facts already acquired or of protection already realized. In the second series of discussion the Conference will have to consider how and with what reservations, especially inspired by the care of tolerable charges, can be thought of an extension of social Insurance in two directions.

On the one hand, the question is to know in which measure and how these forms of insurance, up to now organized nearly exclusively in favour of wage earners, can be extended to other categories whose economic situations are analogous (clerks, for instance, and “independants” such as artisans, small employers, and small farmers).

On the other hand, it must be asked how one can answer to the so various needs of the *entire family*: for example in insuring it against sickness and, especially, in completing the compulsory insurance of pensions by an insurance (voluntary) of small capital, that is to say, in developing the industrial life insurance which in different countries furnishes already to the workingman and the small “independants” the necessary capital to educate their children, to buy a house or land or some small business, or simply a security to the family in case of premature death of its head.

III. In the third series of work, the Conference will place before it, at least in general terms, and with the view of subsequent deeper studies, a problem of present interest which will appear doubtless, as a logical consequence of the statements of facts in the two previous series of discussions. A modification of method, a new orientation, is that not necessary? Instead of securing, only or principally, help in the form of species, ought not Social Insurance rather endeavour to minimize the risks or even prevent them, to improve the general health of the people, to preserve the human capital? The Conference will aid to make better known how certain nations, in putting *Social Insurance to the service of social hygiene*, had been able to intervene energetically against tuberculosis and other common diseases, to ameliorate housing conditions, to give education in hygiene and sanitation, and in a word to realize an economy of life and money.

ORDER OF THE DAY AND FIRST REPORTS ANNOUNCED.

As a resumé, and except for some possible modifications of detail in the future, this program of the Conference has been established as follows. But considering its maximum scope, the fundamental task of the Conference will be therefore, to examine the questions placed under the form of inquiries; as to other points it will introduce them rather in order to see if news inquiries should be opened.

I. NATIONAL AND INTERNATIONAL CHARGES OF SOCIAL INSURANCE.

1. *The present charges by Social Insurance* (results of the preliminary inquiry (no. V) and observations on the possibility of a searching inquiry).

2. *The financial systems of insurance against invalidity.*

3. *Standardization of charges in the different countries and the possibility of general international Conventions on Social Insurance.*

II. EXTENSION OF SOCIAL INSURANCE CONCERNING NEW CATEGORIES AND RISKS.

4. *The extension of Social Insurance to "independants"* (Inquiry no. I).

5. *Extension to satisfy the needs of the family: a) Popular life Insurance* (Inquiry no. II).

6. — do. — b) *Child Insurance and especially Mutual Insurance for School Children* (Inquiry no. III).

7. — do. — c) *Sickness-insurance of the family of the insured.*

III. ORIENTATION OF SOCIAL INSURANCE IN THE DIRECTION OF THE PREVENTION AND LESSENING OF RISKS.

8. *Social Insurance and Social Hygiene* (Influence of insurance on the prevention of accidents and of industrial diseases and its relation with factory inspection; amelioration of housing conditions and investment of funds for social benefit, struggle against prevalent diseases, especially tuberculosis).

9. *Adaptation after accident and invalidity* (Inquiry no. IV).

We are now able to single out a certain number of reports announced by the National Committees relative to questions 1, 4, 5, 6, 9, that is to say, to questions prepared under the form of inquiries:

Question 1 (Inquiry V). — MM. Zahn and Freund (Germany), Widholz, Kögler, Kienböck (Austria), Barriol and Jouanny (France), Posthuma (Holland), Medolaghi (Italy), Kauffmann (Luxemburg).

Question 4 (Inquiry I). — MM. Piloty (Germany), Schmitt, R. Kaan, Eldersch (Austria), Trap (Denmark), Chausse (France), Rutgers (Holland), Camanni (Italy), Kauffmann (Luxemburg).

Question 5 (Inquiry II). — MM. Reuss and Bielefeldt (Germany), Blaschke (Austria), Coulon and Fleury (France), v. Ryckevorsel (Holland), Magaldi (Italy), Kauffmann (Luxemburg).

Question 6 (Inquiry III). — MM. Bielefeldt and Manes (Germany), Blaschke (Austria), Édouard Petit (France), v. Ryckevorsel (Holland), Cavalieri (Italy), Eydt (Luxemburg).

Question 9 (Inquiry IV). — M. Stoecker and Lieniger (Germany), Schnitzler (Austria), Mosny and Deléarde (France), Vossenaer and v. Troojen (Holland), Bernacchi (Italy), Grechen (Luxemburg).

Reports on all or part of these questions are yet to be announced from about a dozen other countries, notably, Hungary, Switzerland, Roumania, Belgium and the United-States.

The reports introducing the other questions will likewise be described later; we are able, though, to indicate now the reports of M. René Austria on question 1, of M. Fuster on Question 3, and of MM. the presidents Kaufmann and Fuster on question 2.

The preliminary reports and the discussions of the Conference of Paris will therefore present to specialists as well as to the Governments and the public at large the vital interest of actuality. There will be found at the same time general views and practical explications of such a nature as to inspire useful remedies and useful extensions of application.

LÉON BOUSSODON, *President.*

ÉDOUARD FUSTER, *Secrétaire général.*

DEPARTMENT OF LABOR.

Washington, July 30, 1914.

THE SECRETARY OF STATE.

Washington, D. C.

SIR: The department has to acknowledge receipt of your letter of the 13th instant and to state in response to the query therein contained that no appropriation is desired for the participation of its accredited representative in the international conference on social insurance to be held at Paris in September, 1914. It seeks simply authority to enable it to designate officials of the department to represent it in this conference.

Respectfully,

J. W. DUNSMON, *Acting Secretary.*

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The reports introducing the other questions will likewise be described later; we are able, though, to indicate now the reports of M. Kaan (Austria) on question 2, of M. Fuster on Question 3, and of MM. the president Kaufmann and Fuster on question 8.

The preliminary reports and the discussions of the Conference of Paris will therefore present to specialists as well as to the Governments and the public at large the vital interest of actuality. There will be found at the same time general views and practical expositions of such a nature as to inspire needful remedies and useful extensions of application.

LÉON BOURGEOIS, *Président.*

ÉDOUARD FUSTER, *Secrétaire général.*

DEPARTMENT OF LABOR,
Washington, July 20, 1914.

The SECRETARY OF STATE,
Washington, D. C.

SIR: The department has to acknowledge receipt of your letter of the 13th instant and to state in response to the query therein contained that no appropriation is desired for the participation of its accredited representative in the international conference on social insurance to be held at Paris in September, 1914. It seeks simply authority to enable it to designate officials of the department to represent it in this conference.

Respectfully,

J. W. DUNSMORE, *Acting Secretary.*

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FIRST-CHOICE VOTE FOR RESERVE-BANK CITIES

LETTER FROM THE RESERVE BANK ORGANIZATION COMMITTEE

TRANSMITTING

IN RESPONSE TO THE RESOLUTION OF THE
HOUSE OF REPRESENTATIVES, DATED APRIL
15, 1914, A STATEMENT OF THE BALLOTS
CAST BY THE VARIOUS NATIONAL BANKS OF
THE UNITED STATES TO DETERMINE THEIR
CHOICE FOR RESERVE CITIES



JULY 29, 1914.—Referred to the Committee on Banking and Currency
and ordered to be printed

WASHINGTON
GOVERNMENT PRINTING OFFICE
1914

FIRST-CHOICE VOTE FOR RESERVE-BANK CITIES.

RESERVE BANK ORGANIZATION COMMITTEE,
Washington, D. C., June 24, 1914.

SIR: The reserve bank organization committee has the honor to acknowledge the receipt of a copy of the resolution of the House of Representatives, dated April 15, 1914, which reads as follows:

Resolved, That the organization committee of the Federal Reserve Board be, and it is hereby, directed to send to the House of Representatives the ballots, or a tabulated statement thereof, cast by the various national banks of the United States to determine their choice for reserve cities according to a request made to said banks by the organization committee of the Federal Reserve Board.

In compliance therewith there is herewith transmitted the information called for.

Respectfully,

W. G. McADOO,
D. F. HOUSTON,
JNO. SKELTON WILLIAMS,
Reserve Bank Organization Committee.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

First-choice vote for reserve-bank cities, by States.

	First.	Second.	Third.		First.	Second.	Thrid.
ALABAMA.				ARKANSAS.			
Atlanta.....	8	35	14	Chicago.....		14	8
Birmingham.....	53	9	1	Dallas.....	1	2	
Chattanooga.....		2	3	Fort Smith.....			1
Cincinnati.....	1	2	4	Kansas City.....	2	16	
Louisville.....		2	3	Little Rock.....		6	2
Memphis.....		1	1	Memphis.....		6	2
Mobile.....		1	2	New Orleans.....		4	12
Montgomery.....	4	3		New York.....			3
Nashville.....		9	27	St. Louis.....	51	3	
New Orleans.....	3		3				
St. Louis.....	1		6	Total.....	54	46	33
Savannah.....	3	2					
Total.....	73	67	64	CALIFORNIA.			
ARIZONA.				Chicago.....		3	4
Chicago.....			1	Denver.....			2
Denver.....		1	2	Fresno.....	1	1	2
El Paso.....	1		1	Kansas City.....		3	2
Kansas City.....	1	1		Los Angeles.....	24	81	9
Los Angeles.....	2	5		New York.....	2		
Phoenix.....			1	Oakland.....		4	1
St. Louis.....			1	Portland.....		9	15
San Francisco.....	8	3	1	Reno.....			1
Total.....	12	10	7	Sacramento.....		2	5
				Salt Lake.....			2
				San Francisco.....	208	25	2
				San Diego.....			5
				St. Louis.....			2

First-choice vote for reserve-bank cities, by States—Continued.

	First.	Second.	Third.		First.	Second.	Third.
CALIFORNIA—continued.				GEORGIA—continued.			
Seattle.....		1	10	Columbia.....			1
Stockton.....				Jacksonville.....		2	
Whittier.....			1	Louisville.....			3
Seattle or Portland, third choice.....			1	Lincoln.....		1	
Total.....	235	133	64	Montgomery.....			2
COLORADO.				Nashville.....		1	1
Chicago.....		20	12	New Orleans.....			12
Denver.....	112	1		New York.....		2	
Kansas City.....	1	37	26	Philadelphia.....			1
Lincoln.....		3	4	Richmond.....		7	27
New York.....			1	Savannah.....	18	48	3
Omaha.....		26	26	Washington.....		2	1
Pueblo.....		1		Birmingham or Columbia third choice.....			1
St. Louis.....		4	14	Columbia or Montgomery third choice.....			2
Salt Lake City.....		3	2	Total.....	108	98	75
San Francisco.....			2	IDAHO.			
Total.....	113	95	87	Chicago.....	2	2	3
CONNECTICUT.				Denver.....	1	6	2
Albany.....			2	Kansas City.....		1	
Boston.....	7	38	3	Minneapolis.....	1	3	
Hartford.....		1	4	New York.....		1	
Middletown.....			1	Omaha.....	2	1	6
New Haven.....		2		Portland.....	10	16	7
New York.....	64	6		St. Paul.....		1	1
Philadelphia.....		2	24	Salt Lake City.....	12	2	17
Springfield.....			1	San Francisco.....	8	12	17
Philadelphia or Pittsburgh third choice.....			(1)	Spokane.....	9		5
Total.....	71	49	35	Seattle.....			1
DELAWARE.				Twin Cities.....			
Baltimore.....	1	3	4	Total.....	45	45	43
Boston.....			1	ILLINOIS.			
New York.....		16	3	Boston.....			2
Philadelphia.....	23	1		Chicago.....	305	93	1
Washington.....			2	Cincinnati.....		1	18
Total.....	24	20	10	Cleveland.....		1	3
DISTRICT OF COLUMBIA.				Davenport, Iowa.....		1	
Baltimore.....		10		Denver.....			2
New York.....		1		Duluth.....			1
Philadelphia.....	12	1	11	Evansville.....		3	1
Washington.....				Indianapolis.....		4	20
Total.....	12	12	11	Joliet.....			2
FLORIDA.				Kansas City.....			10
Atlanta.....	19	19	5	Louisville.....			1
Baltimore.....		3	3	Milwaukee.....		3	
Birmingham.....			2	Minneapolis.....		2	3
Jacksonville.....	14		5	New Orleans.....			1
New Orleans.....	5	4	3	New York.....		21	24
Richmond.....	1	2	10	Omaha.....			1
Savannah.....	3	15	10	Peoria.....		7	4
Washington.....	1			Pittsburgh.....			1
Total.....	44	43	38	Rock Island.....			1
GEORGIA.				St. Louis.....	112	109	25
Atlanta.....	90	15	1	St. Paul.....		1	4
Augusta.....			2	Springfield.....			2
Baltimore.....		3	9	Washington.....			1
Birmingham.....		2	8	Chicago or St. Louis first choice.....	2		
Chattanooga.....		9		Total.....	419	346	133
Cincinnati.....		1	1	INDIANA.			
				Chicago.....	134	65	24
				Cincinnati.....	63	57	29
				Cleveland.....		2	4
				Louisville.....	15	21	27
				Indianapolis.....	19	28	14
				Kansas City.....		1	
				New York.....		5	1

First-choice vote for reserve-bank cities, by States—Continued.

	First.	Second.	Thrd.		First.	Second.	Thrd.
INDIANA—continued.				LOUISIANA—continued.			
Pittsburgh.....		1	2	New Orleans.....	24	1	1
St. Louis.....	3	21	55	New York.....		1	
Cincinnati or St. Louis				St. Louis.....	2	9	5
second choice.....	(1)			Shreveport.....			1
Total.....	234	201	168	Total.....	26	21	20
IOWA.				MAINE.			
Boston.....			2	Albany.....			1
Cedar Rapids.....	2	5		Boston.....	59	2	
Chicago.....	256	34	8	Chicago.....			3
Clinton.....	1			New York.....	2	44	2
Davenport.....			4	Philadelphia.....		1	26
Denver.....			1	Washington.....			1
Des Moines.....	17	31	19	Total.....	61	47	32
Dubuque.....		1		MARYLAND.			
Kansas City.....		8	13	Baltimore.....	95	2	1
Minneapolis.....	4	37	33	Boston.....			1
New York.....		6	2	Cincinnati.....		1	
Omaha.....	17	42	31	New York.....	1	14	14
St. Louis.....		14	23	Philadelphia.....		26	20
St. Paul.....		7	6	Pittsburgh.....	1	5	7
San Francisco.....			1	Richmond.....		1	3
Sioux City.....	5	18	4	Washington.....	1	24	14
Des Moines or St. Louis..		1		Total.....	98	72	60
St. Paul or Minneapolis..			1	MASSACHUSETTS.			
Twin Cities.....	1			Albany.....			10
Total.....	303	305	153	Boston.....	137	12	
KANSAS.				Chicago.....			4
Chicago.....		52	61	New York.....	17	77	2
Denver.....		1	4	Philadelphia.....			19
Kansas City.....	8	8	1	Providence.....		1	
Kansas City, Mo.....	179	9		Springfield.....		1	2
Lincoln.....		1	2	Washington.....			4
New York.....		1	5	Total.....	154	91	41
Omaha.....		5	3	MICHIGAN.			
St. Joseph.....		3	1	Boston.....			1
St. Louis.....		74	44	Chicago.....	72	22	1
St. Paul.....		1	1	Cincinnati.....			4
Topeka.....		1	4	Cleveland.....		2	16
Wichita.....	2	3	1	Detroit.....	23	27	2
Kansas City, Mo., or				Grand Rapids.....			4
Kansas City, Kans.....	9			Kalamazoo.....			1
Total.....	198	159	127	Milwaukee.....		5	3
KENTUCKY.				Minneapolis.....		3	2
Atlanta.....			7	Muskegon.....			1
Baltimore.....		2	1	New York.....		1	7
Birmingham.....			2	St. Paul.....			1
Chattanooga.....			1	Twin Cities (St. Paul or			
Chicago.....		10	32	Minneapolis).....			
Cincinnati.....	34	51	12	Toledo.....			1
Cleveland.....			1	Total.....	95	60	45
Indianapolis.....			2	MINNESOTA.			
Knoxville.....			1	Chicago.....	8	24	173
Louisville.....	93	32	1	Dubuque.....			1
Memphis.....			2	Duluth.....			8
Nashville.....		5	4	Fargo.....			2
New Orleans.....			3	Mankato.....			2
New York.....		2	4	Milwaukee.....			1
Richmond.....			15	Minneapolis.....	138	50	1
St. Louis.....	1	16	18	New York.....			1
Total.....	128	119	106	St. Louis.....			1
LOUISIANA.				St. Paul.....	52	164	11
Atlanta.....		2	6				
Chicago.....		1	2				
Dallas.....		2	3				
Houston.....		2	1				
Memphis.....		3	1				

First-choice vote for reserve-bank cities, by States—Continued.

	First.	Second.	Thrd.		First.	Second.	Thrd.
MINNESOTA—continued.				NEW HAMPSHIRE.			
Sioux City.....		1	1	Atlanta.....			1
Winona.....			1	Albany.....			1
Minneapolis or St. Paul..	11	1		Boston.....	50		1
Total.....	250	240	203	Chicago.....			1
MISSISSIPPI.				Concord.....		1	
Atlanta.....		2	5	New York.....	28		1
Birmingham.....	1		3	Philadelphia.....			10
Chicago.....			3	Total.....	50	20	15
Cincinnati.....		1	1	NEW JERSEY.			
Memphis.....	8	9	5	Albany.....			1
Mobile.....		1	2	Atlanta.....			2
Nashville.....			1	Baltimore.....			4
New Orleans.....	19	8	4	Boston.....	1	2	25
New York.....		1		Buffalo.....			1
St. Louis.....	4	6	2	Chicago.....			2
Total.....	32	28	26	Jersey City.....		1	3
MISSOURI.				Newark.....		4	2
Chicago.....	4	11	42	New York.....	122	53	3
Kansas City.....	64	26	3	Paterson.....		2	
Kansas City, Kans.....		2		Philadelphia.....	65	60	6
New York.....		1		Pittsburgh.....		1	1
Omaha.....			1	Washington.....		1	4
St. Louis.....	47	43	9	Total.....	188	124	54
Springfield.....			3	NEW MEXICO.			
St. Louis or Kansas City..	1			Dallas.....	3	6	6
Total.....	116	83	58	Denver.....	9	9	2
MONTANA.				Chicago.....			5
Chicago.....	1	22	24	El Paso.....	1	1	
Denver.....			3	Fort Worth.....		1	1
Minneapolis.....	18	10		Houston.....			1
New York.....			1	Kansas City.....	20	10	2
Omaha.....		1	1	St. Louis.....		2	6
Portland.....			2	San Francisco.....		1	1
St. Louis.....			2	Dallas or Fort Worth.....		1	
St. Paul.....	10	14	3	Denver or El Paso.....			1
Seattle.....		2	1	Total.....	33	31	26
Spokane.....	4		6	NEW YORK.			
Twin Cities.....	20	2		Albany.....	10	70	26
Spokane or Seattle, third choice.....			(1)	Atlanta.....			1
Total.....	53	51	43	Boston.....	1	34	55
NEBRASKA.				Buffalo.....	13	13	16
Chicago.....	5	110	54	Brooklyn.....	1	1	
Denver.....	2	7	7	Chicago.....		9	4
Fremont.....			1	Cleveland.....		6	1
Kansas City.....	8	9	49	Kingston.....			1
Lincoln.....	22	58	25	New York.....	393	16	4
Minneapolis.....			9	Philadelphia.....		60	48
New York.....			3	Pittsburgh.....		7	6
Omaha.....	181	32	3	Rochester.....		2	9
St. Joseph.....			2	San Francisco.....			3
St. Louis.....		2	26	Schenectady.....		1	
St. Paul.....			2	Syracuse.....	1	5	4
Sioux City.....	3	5	3	St. Louis.....			6
Omaha or Lincoln.....	2			Troy.....		1	
Total.....	223	223	184	Utica.....		1	4
NEVADA.				Stamford.....			1
Denver.....			3	Washington.....		3	4
Los Angeles.....		1		Baltimore or Washington.....			1
Omaha.....			1	New York or Albany.....	1		
Salt Lake City.....	2	2		Total.....	420	229	194
San Francisco.....	5	2		NORTH CAROLINA.			
Total.....	7	5	4	Atlanta.....		1	2
NEW HAMPSHIRE.				Baltimore.....		23	17
Atlanta.....			1	Charlotte.....	18	8	6
Albany.....			1	Columbia.....		1	
Boston.....	50		1	New York.....		3	3
Chicago.....			1	Philadelphia.....		3	7
Concord.....		1		Richmond.....	44	13	1
New York.....	28		1				
Philadelphia.....			10				
Total.....	50	20	15				
NEW JERSEY.							
Albany.....			1				
Atlanta.....			2				
Baltimore.....			4				
Boston.....	1	2	25				
Buffalo.....			1				
Chicago.....			2				
Jersey City.....		1	3				
Newark.....		4	2				
New York.....	122	53	3				
Paterson.....		2					
Philadelphia.....	65	60	6				
Pittsburgh.....		1	1				
Washington.....		1	4				
Total.....	188	124	54				
NEW MEXICO.							
Dallas.....	3	6	6				
Denver.....	9	9	2				
Chicago.....			5				
El Paso.....	1	1					
Fort Worth.....		1	1				
Houston.....			1				
Kansas City.....	20	10	2				
St. Louis.....		2	6				
San Francisco.....		1	1				
Dallas or Fort Worth.....		1					
Denver or El Paso.....			1				
Total.....	33	31	26				
NEW YORK.							
Albany.....	10	70	26				
Atlanta.....			1				
Boston.....	1	34	55				
Buffalo.....	13	13	16				
Brooklyn.....	1	1					
Chicago.....		9	4				
Cleveland.....		6	1				
Kingston.....			1				
New York.....	393	16	4				
Philadelphia.....		60	48				
Pittsburgh.....		7	6				
Rochester.....		2	9				
San Francisco.....			3				
Schenectady.....		1					
Syracuse.....	1	5	4				
St. Louis.....			6				
Troy.....		1					
Utica.....		1	4				
Stamford.....			1				
Washington.....		3	4				
Baltimore or Washington.....			1				
New York or Albany.....	1						
Total.....	420	229	194				
NORTH CAROLINA.							
Atlanta.....		1	2				
Baltimore.....		23	17				
Charlotte.....	18	8	6				
Columbia.....		1					
New York.....		3	3				
Philadelphia.....		3	7				
Richmond.....	44	13	1				

First-choice vote for reserve-bank cities, by States—Continued.

	First.	Second.	Third.		First.	Second.	Third.
TENNESSEE.				VIRGINIA—continued.			
Atlanta.....	7	14	13	Philadelphia.....	7	9	
Baltimore.....	1		2	Richmond.....	96	8	8
Chattanooga.....	11	7	1	Washington.....	9	36	30
Chicago.....			3	Total.....	118	106	98
Cincinnati.....	14	16	15	WASHINGTON.			
Knoxville.....		1		Chicago.....		5	11
Louisville.....	8	13	11	Minneapolis.....		3	6
Memphis.....	8	6	3	Portland.....	9	22	15
Nashville.....	26	10	5	St. Louis.....			1
New Orleans.....			2	St. Paul.....		3	
New York.....			2	San Francisco.....	8	16	21
Richmond.....	2	4	5	Seattle.....	40	17	5
St. Louis.....	8	11	16	Spokane.....	16	5	6
Washington.....	1			Twin Cities.....			3
Cincinnati or Atlanta.....	1	1		Seattle or Portland, second choice.....		1	
Nashville or Atlanta.....	1			San Francisco or Twin Cities, third choice.....			1
Total.....	86	83	78	Total.....	73	71	66
TEXAS.				WEST VIRGINIA.			
Atlanta.....			1	Baltimore.....	21	23	26
Austin.....		1	8	Chicago.....			1
Chicago.....		2	5	Cincinnati.....	26	13	19
Denver.....		1	2	Cleveland.....		2	
Dallas.....	212	121	30	Columbus.....			1
El Paso.....			1	New York.....	1	7	7
Fort Worth.....	84	69	30	Philadelphia.....		1	6
Galveston.....	2	4	4	Pittsburgh.....	41	13	8
Houston.....	97	78	87	Richmond.....	16	12	9
Kansas City.....	12	20	40	Washington.....	13	13	17
New Orleans.....		4	44	Wheeling.....		1	
New York.....	1			Washington or Baltimore, third choice.....			2
Oklahoma City.....		1	2	Washington or Baltimore, second choice.....		2	
St. Louis.....	13	96	110	Total.....	105	94	92
San Antonio.....	1	2	12	WISCONSIN.			
San Francisco.....			4	Chicago.....	89	17	11
Waco.....	2	1	10	Cleveland.....			1
Wichita.....		1	1	Dubuque.....			1
Dallas or Fort Worth.....	3	1		Madison.....			1
Dallas or Houston.....	7	1		Milwaukee.....	13	23	2
Dallas, Fort Worth, or Houston.....	3			Minneapolis.....	8	16	23
St. Louis or Kansas City.....	1			New York.....		1	1
Fort Worth or Dallas.....		1		St. Louis.....		1	3
Chicago or Denver.....		4		St. Paul.....	7	9	7
Total.....	438	408	391	Twin Cities.....	1	1	4
UTAH.				St. Louis or Minneapolis.....			1
Chicago.....	1	1		Total.....	118	73	54
Denver.....		5	6	WYOMING.			
Los Angeles.....			1	Chicago.....		5	4
New York.....			1	Denver.....	12	8	2
Omaha.....		1	7	Kansas City.....			3
Salt Lake City.....	13			Omaha.....	10	11	4
San Francisco.....	6	11	2	St. Louis.....			1
Total.....	20	18	17	Salt Lake City.....	4		1
VERMONT.				St. Paul or Minneapolis, first choice.....	1		
Albany.....		4	4	Total.....	26	24	15
Boston.....	23	14	2	RECAPITULATION.			
Chicago.....		1	3	Alabama.....	73	67	64
New York.....	19	17	2	Arizona.....	12	10	7
Philadelphia.....			5	Arkansas.....	54	46	33
Total.....	42	35	14				
VIRGINIA.							
Baltimore.....	11	47	26				
Atlanta.....			2				
Cincinnati.....	1	1	3				
Louisville.....		1					
New York.....	1	6	15				

First-choice vote for reserve-bank cities, by States—Continued.

	First.	Second.	Thrd.		First.	Second.	Thrd.
RECAPITULATION—contd.				RECAPITULATION—contd.			
California.....	235	123	64	New Hampshire.....	50	20	15
Colorado.....	113	96	87	New Jersey.....	188	124	54
Connecticut.....	71	49	36	New Mexico.....	33	31	26
Delaware.....	24	20	10	New York.....	420	229	194
District of Columbia.....	12	12	11	North Carolina.....	64	60	53
Florida.....	44	43	38	North Dakota.....	125	120	108
Georgia.....	108	98	75	Ohio.....	343	283	270
Idaho.....	45	45	43	Oklahoma.....	263	262	191
Illinois.....	419	246	132	Oregon.....	73	68	56
Indiana.....	234	202	168	Pennsylvania.....	764	667	306
Iowa.....	303	305	153	Rhode Island.....	16	13	6
Kansas.....	198	159	127	South Carolina.....	42	43	43
Kentucky.....	128	119	106	South Dakota.....	99	95	77
Louisiana.....	26	21	20	Tennessee.....	86	83	78
Maine.....	61	47	32	Texas.....	438	408	391
Maryland.....	98	72	60	Utah.....	20	18	17
Massachusetts.....	154	91	41	Vermont.....	42	35	14
Michigan.....	95	60	45	Virginia.....	118	106	93
Minnesota.....	259	240	203	Washington.....	73	72	69
Mississippi.....	32	28	26	West Virginia.....	106	96	94
Missouri.....	116	89	58	Wisconsin.....	118	73	54
Montana.....	53	51	44	Wyoming.....	27	24	15
Nebraska.....	223	223	184				
Nevada.....	7	5	4	Total.....	6,724	5,504	4,179

First-choice vote for reserve-bank cities, by districts.

DISTRICT NO. 1.

	Maine.	New Hampshire.	Vermont.	Massachusetts.	Rhode Island.	Connecticut.	Total.
Boston.....	59	50	23	117	11	7	267
New York.....	2		19	17		64	106
Providence.....							1
Total.....	61	50	42	154	16	71	394

DISTRICT NO. 2.

	New York.
New York City.....	363
Buffalo.....	13
Albany.....	10
Boston.....	1
Brooklyn.....	1
Syracuse.....	1
New York or Albany.....	1
Total.....	420

DISTRICT NO. 3.

	Delaware.	New Jersey.	Pennsylvania, eastern district.	Total.
Philadelphia.....	23	65	417	505
New York.....		122	42	164
Pittsburgh.....			23	23
Baltimore.....	1		11	12
Boston.....		1	1	2
Buffalo.....			1	1
Washington.....			1	1
Total.....	24	188	496	708

FIRST-CHOICE VOTE FOR RESERVE-BANK CITIES.

First-choice vote for reserve-bank cities, by districts—Continued.

DISTRICT NO. 4.

	West Virginia, northern district.	Ken- tucky, eastern district.	Ohio.	Pennsyl- vania, western district.	Total.
Cleveland.....			107	3	110
Cincinnati.....		34	160		194
Chicago.....			2		2
Columbus.....			36		36
New York.....	1		2	3	6
Pittsburgh.....	7		31	256	294
Toledo.....			1		1
Philadelphia.....				6	6
Louisville.....		31			31
Cincinnati or Cleveland.....			2		2
Cleveland or Pittsburgh.....			2		2
Louisville or Cincinnati.....		1			1
Total.....	8	66	343	268	685

DISTRICT NO. 5.

	Maryland.	District of Co- lumbia.	West Virginia, southern district.	Virginia.	North Carolina.	South Carolina.	Total.
Richmond.....			16	96	44	11	167
Baltimore.....	95		21	11		1	128
Pittsburgh.....	1		34				35
Columbia.....						28	28
Cincinnati.....			26	1			27
Washington.....	1	12		9	2	1	26
Charlotte.....					18	1	19
New York.....	1			1			2
Total.....	98	12	97	118	64	42	431

DISTRICT NO. 6.

	Alabama.	Florida.	Georgia.	Tennes- see, eastern district.	Miss- sissippi, southern district.	Louis- iana, south- eastern district.	Total.
Atlanta.....	8	19	90	7			124
Birmingham.....	53	1					54
New Orleans.....	3	5			19	4	31
Savannah.....	3	3	18				24
Nashville.....				22			22
Cincinnati.....	1			14			15
Jacksonville.....		14					14
Chattanooga.....				11			11
Louisville.....				7			7
St. Louis.....	1			4			5
Montgomery.....	4						4
Richmond.....		1		2			3
Washington.....		1		1			2
Memphis.....				1			1
Baltimore.....				1			1
Nashville or Atlanta.....				1			1
Total.....	73	44	108	71	19	4	319

First-choice vote for reserve-bank cities, by districts—Continued.

DISTRICT NO. 10.

	Colorado.	Kansas.	Missouri, western district.	New Mexico, western district.	Oklahoma, northern district.	Wyoming.	Nebraska.	Total.
Kansas City, Mo.	1	179	37	2	128	.....	8	355
Denver	112	.....	.....	6	.....	12	2	132
St. Louis			4	.....	24	.....	.....	28
Lincoln							22	22
Omaha						10	181	191
Kansas City, Kans., or Kansas City, Mo.		9	.....	.....	.....	.....	.....	9
Kansas City, Kans.		8	.....	.....	.....	.....	.....	8
Chicago			4	.....	.....	.....	5	9
Salt Lake City						4	.....	4
Wichita		2	.....	.....	1	.....	.....	3
Sioux City							3	3
Oklahoma City					2	.....	.....	2
Twin Cities						1	.....	1
Omaha or Lincoln							2	2
Total	113	198	45	8	155	27	223	769

DISTRICT NO. 11.

	Texas.	Arizona, southern district.	New Mexico, southern district.	Oklahoma, southern district.	Louisiana, western district.	Total.
Dallas	212	.....	3	17	.....	232
Kansas City	12	1	18	74	.....	105
Houston	97	.....	.....	.....	.....	97
Fort Worth	84	.....	.....	3	.....	87
St. Louis	13	.....	.....	32	1	46
New Orleans .....	.....	.....	.....	.....	21	21
Dallas or Houston	7	.....	.....	.....	.....	7
Dallas or Fort Worth	3	.....	.....	1	.....	4
Dallas, Fort Worth, or Houston ..	3	.....	.....	.....	.....	3
San Francisco .....	.....	3	.....	.....	.....	3
Denver .....	.....	.....	3	.....	.....	3
El Paso .....	.....	1	1	.....	.....	2
Waco	2	.....	.....	.....	.....	2
Galveston	2	.....	.....	.....	.....	2
New York	1	.....	.....	.....	.....	1
San Antonio	1	.....	.....	.....	.....	1
Oklahoma City .....	.....	.....	.....	1	.....	1
St. Louis or Kansas City	1	.....	.....	.....	.....	1
Total	438	5	25	128	22	618

DISTRICT NO. 12.

	Washington.	Oregon.	Idaho.	California.	Nevada.	Utah.	Arizona, northern district.	Total.
San Francisco	8	16	8	208	5	6	5	266
Portland	9	56	10	.....	.....	.....	.....	75
Seattle	40	.....	.....	.....	.....	.....	.....	40
Salt Lake .....	.....	.....	12	.....	2	13	.....	27
Spokane	16	1	9	24	.....	.....	.....	26
Los Angeles .....	.....	.....	.....	.....	.....	.....	2	26
Chicago .....	.....	.....	2	.....	.....	1	.....	3
New York .....	.....	.....	.....	2	.....	.....	.....	2
Omaha .....	.....	.....	2	.....	.....	.....	.....	2
Fresno .....	.....	.....	.....	1	.....	.....	.....	1
Minneapolis .....	.....	.....	1	.....	.....	.....	.....	1
Denver .....	.....	.....	1	.....	.....	.....	.....	1
Total	73	73	45	235	7	20	7	460

RECAPITULATION.

District:		District:	
No. 1	394	No. 8	414
No. 2	420	No. 9	645
No. 3	708	No. 10	769
No. 4	685	No. 11	618
No. 5	431	No. 12	460
No. 6	319		
No. 7	861		
		Total	6,794

First-choice vote for reserve-bank cities, by cities.

Albany:		Cincinnati—Continued.	
New York.....	10	Tennessee.....	14
		Virginia.....	1
Atlanta:		West Virginia.....	26
Alabama.....	8		
Florida.....	19	Cleveland:	
Georgia.....	90	Ohio.....	107
Tennessee.....	7	Pennsylvania.....	3
	124		110
Baltimore:			
Delaware.....	1	Clinton:	
Maryland.....	95	Iowa.....	1
Pennsylvania.....	11		
South Carolina.....	1	Columbia, S. C.:	
Tennessee.....	1	South Carolina.....	28
Virginia.....	11		
West Virginia.....	21	Columbus:	
		Ohio.....	86
	141		
Birmingham:		Dallas:	
Mississippi.....	1	Arkansas.....	1
Alabama.....	53	New Mexico.....	3
Florida.....	1	Oklahoma.....	17
		Texas.....	212
	55		
Boston:			233
Connecticut.....	7	Denver:	
Maine.....	59	Colorado.....	112
Massachusetts.....	137	Idaho.....	1
New Hampshire.....	50	Nebraska.....	2
New Jersey.....	1	New Mexico.....	9
New York.....	1	Wyoming.....	12
Pennsylvania.....	1		
Rhode Island.....	11		136
Vermont.....	23		
		Des Moines:	
	290	Iowa.....	17
Brooklyn:			
New York.....	1	Detroit:	
		Michigan.....	23
Buffalo:			
New York.....	13	El Paso:	
Pennsylvania.....	1	New Mexico.....	1
		Arizona.....	1
	14		
Cedar Rapids:			2
Iowa.....	2	Fargo:	
		North Dakota.....	1
Charlotte:			
North Carolina.....	18	Fort Worth:	
South Carolina.....	1	Oklahoma.....	1
		Texas.....	84
	19		
Chattanooga:			85
Tennessee.....	11	Fresno:	
		California.....	1
Chicago:			
Idaho.....	2	Galveston:	
Illinois.....	305	Texas.....	2
Indiana.....	134		
Iowa.....	256	Houston:	
Michigan.....	72	Texas.....	97
Minnesota.....	8		
Missouri.....	4	Indianapolis:	
Montana.....	1	Indiana.....	19
Nebraska.....	5		
North Dakota.....	2	Jacksonville:	
Ohio.....	2	Florida.....	14
South Dakota.....	25		
Wisconsin.....	89	Kansas City, Mo.:	
Utah.....	1	Arizona.....	1
		Arkansas.....	2
	906	Kansas.....	179
Cincinnati:		Missouri.....	64
Alabama.....	1	Nebraska.....	8
Indiana.....	63	New Mexico.....	20
Kentucky.....	34	Oklahoma.....	202
Ohio.....	160	Texas.....	12
		Colorado.....	1
			480

DISTRICT NO. 10.

	Colorado.	Kansas.	Missouri, western district.	New Mexico, western district.	Oklah- oma, northern district.	Wy- oming
Kansas City, Mo.	1	179	37	3	128	
Denver	112			6		12
St. Louis			4		24	
Lincoln						
Omaha						26
Kansas City, Kans. or Kansas City, Mo.		9				
Kansas City, Kans. Chicago		8				
Chicago			4			
Salt Lake City						
Wichita						4
Shoux City		2			1	
Oklahoma City						
Twin Cities					2	
Omaha or Lincoln						1
Total	113	196	45	9	155	22

DISTRICT NO. 11

	Texas	Central American Contract	New Mexico, Northern Contract	Oklahoma, New Mexico Contract	California Contract
1					
2					
3					
4					
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11					
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97					
98					
99					
100					

First-choice vote for reserve-bank cities, by cities—Continued.

Kansas City, Kans.:		Pittsburgh:	
Kansas.....	8	Maryland.....	1
Lincoln:		Pennsylvania.....	283
Nebraska.....	22	West Virginia.....	41
		Ohio.....	31
			355
Los Angeles:		Portland:	
Arizona.....	2	Idaho.....	10
California.....	24	Oregon.....	56
		Washington.....	9
			75
Louisville:		Providence:	
Indiana.....	15	Rhode Island.....	1
Kentucky.....	93		
Tennessee.....	8	Richmond:	
	116	Florida.....	1
		North Carolina.....	44
Memphis:		South Carolina.....	11
Mississippi.....	8	Tennessee.....	2
Tennessee.....	8	Virginia.....	96
	16	West Virginia.....	16
			170
Milwaukee:		Salt Lake City:	
Wisconsin.....	13	Idaho.....	12
		Nevada.....	2
Minneapolis:		Utah.....	13
Idaho.....	1	Wyoming.....	4
Iowa.....	4		31
Minnesota.....	188	San Antonio:	
Montana.....	18	Texas.....	1
North Dakota.....	97	San Francisco:	
South Dakota.....	54	Arizona.....	8
Wisconsin.....	8	California.....	208
	370	Idaho.....	8
Montgomery:		Nevada.....	5
Alabama.....	4	Oregon.....	16
Nashville:		Utah.....	6
Tennessee.....	25	Washington.....	8
			259
New Orleans:		Savannah:	
Alabama.....	3	Alabama.....	3
Florida.....	5	Florida.....	3
Louisiana.....	24	Georgia.....	18
Mississippi.....	19		24
	51	St. Louis:	
New York:		Alabama.....	1
California.....	2	Arkansas.....	51
Connecticut.....	64	Illinois.....	112
Maine.....	2	Indiana.....	3
Maryland.....	1	Kentucky.....	1
Massachusetts.....	17	Louisiana.....	2
New Jersey.....	122	Mississippi.....	4
New York.....	393	Missouri.....	47
Ohio.....	2	Tennessee.....	8
Pennsylvania.....	43	Texas.....	13
Rhode Island.....	4	Oklahoma.....	57
Vermont.....	19		299
Virginia.....	1	St. Paul:	
Texas.....	1	Minnesota.....	52
West Virginia.....	1	Montana.....	10
	672	North Dakota.....	19
Oklahoma City:		South Dakota.....	6
Oklahoma.....	3	Wisconsin.....	7
Omaha:			94
Idaho.....	2	Seattle:	
Iowa.....	17	Washington.....	40
Nebraska.....	181	Sioux City:	
South Dakota.....	8	Iowa.....	5
Wyoming.....	10	Nebraska.....	3
	218	South Dakota.....	2
Philadelphia:			10
Delaware.....	23		
New Jersey.....	65		
Pennsylvania.....	420		
	508		

First-choice vote for reserve-bank cities, by cities—Continued.

Spokane:		Waco:	
Idaho.....	9	Texas.....	2
Montana.....	4		
Washington.....	16	Wichita:	
Oregon.....	1	Kansas.....	2
	30	Oklahoma.....	1
			3
Syracuse:		Twin Cities (Minneapolis or St. Paul):	
New York.....	1	Iowa.....	1
		Montana.....	20
Toledo:		Minnesota.....	11
Ohio.....	1	North Dakota.....	6
		South Dakota.....	4
Washington, D. C.:		Wisconsin.....	1
District of Columbia.....	12	Wyoming.....	1
Florida.....	1		44
Maryland.....	1		
North Carolina.....	2		
South Carolina.....	1		
Virginia.....	9		
Pennsylvania.....	1		
Tennessee.....	1		
	28		

ALTERNATIVES.

Chicago or St. Louis:		Cleveland or Pittsburgh:	
Illinois.....	2	Ohio.....	
Kansas City, Kans., or Kansas City, Mo.:		Dallas or Fort Worth:	
Kansas.....	9	Oklahoma.....	1
		Texas.....	3
St. Louis or Kansas City:			4
Missouri.....	1	Boston or Philadelphia:	
Oklahoma.....	1	Pennsylvania.....	1
Texas.....	1		
	3	Nashville or Atlanta:	
Omaha or Lincoln:		Tennessee.....	1
Nebraska.....	2		
		Philadelphia or Pittsburgh:	
New York or Albany:		Pennsylvania.....	1
New York.....	1		
Cincinnati or Cleveland:		Dallas or Houston:	
Ohio.....	2	Texas.....	7
		Dallas, Fort Worth, or Houston:	
		Texas.....	3

RECAPITULATION.

Albany.....	10	Memphis.....	16
Atlanta.....	124	Milwaukee.....	13
Baltimore.....	141	Minneapolis.....	370
Birmingham.....	55	Montgomery.....	4
Boston.....	290	Nashville.....	26
Brooklyn.....	1	New Orleans.....	51
Buffalo.....	14	New York.....	672
Cedar Rapids.....	2	Oklahoma City.....	3
Charlotte.....	19	Omaha.....	218
Chattanooga.....	11	Philadelphia.....	508
Chicago.....	906	Pittsburgh.....	365
Cincinnati.....	299	Portland.....	76
Cleveland.....	110	Providence.....	1
Clinton.....	1	Richmond.....	170
Columbia, S. C.....	28	Salt Lake.....	31
Columbus.....	36	San Antonio.....	1
Dallas.....	233	San Francisco.....	269
Denver.....	136	Savannah.....	24
Des Moines.....	17	St. Louis.....	299
Detroit.....	23	St. Paul.....	94
El Paso.....	2	Seattle.....	40
Fargo.....	1	Sioux City.....	10
Fort Worth.....	86	Spokane.....	80
Fresno.....	1	Syracuse.....	1
Galveston.....	2	Toledo.....	1
Houston.....	97	Washington.....	28
Indianapolis.....	19	Waco.....	2
Jacksonville.....	14	Wichita.....	3
Kansas City, Mo.....	489	Twin Cities.....	44
Kansas City, Kans.....	8	Alternatives.....	38
Lincoln.....	22		
Los Angeles.....	26		
Louisville.....	116		
		Total.....	6,724

RELIEF, PROTECTION, AND TRANSPORTATION OF
AMERICANS IN EUROPE.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

REQUESTING

AN APPROPRIATION FOR THE RELIEF, PROTECTION, AND TRANSPORTATION OF AMERICAN CITIZENS IN EUROPE.

AUGUST 3, 1914.—Referred to the Committee on Appropriations and ordered to be printed.

To the Senate and House of Representatives:

The present disturbances in Europe, with the consequent interruption of transportation facilities, the increase in living expenses, coupled with the difficulty of obtaining money from this country, have placed a large number of American citizens, temporarily or permanently resident in Europe, in a serious situation and have made it necessary for the United States to provide relief and transportation to the United States or to places of safety.

The situation has also thrown upon our diplomatic and consular officers an enormous burden in caring for the interests of Americans in the disturbed areas and makes it necessary to provide for greatly increased expenses.

In view of the exigency of the situation as above outlined, I recommend the immediate passage by the Congress of an act appropriating \$250,000, or so much thereof as may be necessary, to be placed at the disposal of the President, for the relief, protection, and transportation of American citizens, for personal services, and for other expenses which may be incurred in connection with or growing out of the existing disturbance in Europe.

WOODROW WILSON.

THE WHITE HOUSE, August 3, 1914.



RELIEF OF AMERICAN CITIZENS ABROAD.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

RECOMMENDING

PASSAGE BY CONGRESS OF ACT MAKING APPROPRIATION FOR
RELIEF OF AMERICAN CITIZENS, ETC.

AUGUST 4, 1914.—Referred to the Committee on Appropriations and ordered to
be printed.

To the Senate and House of Representatives:

After further consideration of the existing condition in Europe in so far as it is affecting citizens of the United States who are there without means, financial or otherwise, to return to their homes in this country, it seems incumbent upon the Government to take steps at once to provide adequate means by the chartering of vessels or otherwise of bringing Americans out of the disturbed region and conveying them to their homes in the United States. Moreover, in view of the difficulty of obtaining money upon letters of credit, with which most Americans abroad are supplied, it will be necessary to send agents abroad with funds which can be advanced on such evidences of credit, or used for the assistance of destitute citizens of the United States.

In these circumstances I recommend the immediate passage by the Congress of an act appropriating \$2,500,000, or so much thereof as may be necessary, to be placed at the disposal of the President, for the relief, protection, and transportation of American citizens and for personal services, rent, and other expenses which may be incurred in the District of Columbia, or elsewhere, connected with, or growing out of, the existing disturbance in Europe.

WOODROW WILSON.

THE WHITE HOUSE, August 4, 1914.



ACT OF PHILIPPINE LEGISLATURE.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

TRANSMITTING

**ACT NO. 2325 OF THE THIRD PHILIPPINE LEGISLATURE, ENTITLED
"AN ACT AMENDING SECTION 13 OF ACT NO. 926, KNOWN AS
'THE PUBLIC-LAND ACT,' BY SPECIFYING THE MANNER IN WHICH
THE PUBLICATION OF THE NOTICES OF SALE OF LANDS SHALL
BE MADE."**

AUGUST 22, 1914.—Referred to the Committee on Insular Affairs and ordered to be printed with accompanying papers.

To the Senate and House of Representatives:

I submit herewith act No. 2325 of the third Philippine Legislature, entitled "An act amending section thirteen of act numbered nine hundred and twenty-six, known as 'the public-land act,' by specifying the manner in which the publication of the notices of sale of lands shall be made."

I have approved the act and submit it in accordance with the provisions of section 13 of the act of Congress approved July 1, 1902, entitled "An act temporarily to provide for the administration of the affairs of civil government in the Philippine Islands, and for other purposes."

I also transmit herewith a letter of the Secretary of War explaining the scope of the act.

WOODROW WILSON.

THE WHITE HOUSE, August 22, 1914.

[Third Philippine Legislature, special session of 1914. A. B. No. 604.]

[No. 2325.]

AN ACT Amending section thirteen of Act Numbered Nine hundred and twenty-six, known as "the public land Act," by specifying the manner in which the publication of the notices of sale of lands shall be made.

By authority of the United States be it enacted by the Philippine Legislature that—

SECTION 1. Paragraph two of section thirteen of Act Numbered Nine hundred and twenty-six is hereby amended to read as follows:

"It shall also be the duty of the Director of Lands to appraise the land applied for under this chapter, which appraisement shall not be less than ten pesos, Philippine currency, per hectare, and in making this appraisal he may call to his assistance any provincial or municipal official of the province in which the land lies. When the land shall have been appraised, as hereinbefore provided, the Director of Lands, shall advertise the same for sale by publishing a notice thereof once a week for six consecutive weeks, in two newspapers, one published in Manila and the other (if such there be) published near the land applied for. One of said notices shall be published in English in a newspaper published in that language, and the other in Spanish in a newspaper published in that language. The Director of Lands shall, with the approval of the Secretary of the Interior, prescribe, in addition to the publication in newspapers, a suitable method of posting notice upon the land sought to be purchased or in the pueblo where the land is situated. The notices shall state a date not earlier than ten days after the date of the last publication of the notice in the newspaper published at Manila, upon which date the Director of Lands will award the land to the highest bidder, or will call for new bids, or otherwise proceed as provided by law."

SEC. 2. When this Act shall have been approved by the President of the United States and shall have received the express or implied sanction of Congress, as provided by section thirteen of the Act of Congress approved July first, nineteen hundred and two, entitled "An Act temporarily to provide for the administration of the affairs of civil government in the Philippine Islands, and for other purposes," such facts shall be made known by proclamation of the Governor-General of the Islands, and this Act shall take effect on the date of such proclamation.

Enacted, February 19, 1914.

(Signed) FRANCIS BURTON HARRISON,
President of the Commission.
(Signed) S. OSMEÑA,
Speaker of the Assembly.

Finally passed the commission on February 19, 1914.

(Signed) GEO. C. SCHWEICKERT,
Secretary of the Commission.

This act, which originated in the Philippine Assembly, finally passed the assembly on February 13, 1914.

(Signed) TEODORO M. KALAW,
Secretary of the Assembly.

THE WHITE HOUSE, 20 August, 1914.

Approved:

(Signed) WOODROW WILSON.

WAR DEPARTMENT,
Washington, August 17, 1914.

The PRESIDENT,
The White House.

MY DEAR MR. PRESIDENT: I beg to submit herewith for your approval, in accordance with the provisions of section 13 of the act of Congress approved July 1, 1902, entitled "An act temporarily to provide for the administration of affairs of civil government in the Philippine Islands, and for other purposes," an act of the Philippine Legislature, No. 2325, enacted February 19, 1914.

ACT OF PHILIPPINE LEGISLATURE

The purpose of this act is to amend section of public land law relating to the publication of public land. The original law provided:

* * * When the land shall have been appraised, Chief of the Bureau of Public Lands shall advertise the same by a notice thereof once a week for six consecutive weeks published at Manila and the other (if any such there be) published for, such notice to be published in both the English and Spanish.

This is changed by the inclosed act to read:

* * * When the land shall have been appraised, Director of Lands shall advertise the same for sale by publication a week for six consecutive weeks in two newspapers, the other (if such there be) published near the land and shall be published in English in a newspaper published elsewhere in Spanish in a newspaper published in that language.

It is thus seen that the contemplated change is important, and no objections thereto are apparent. I therefore recommend that the act be approved.

Very sincerely,

(Signed)

LINDL

Inclosure: Act of Philippine Legislature, 1901

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RAILWAY MAIL PAY

REPORT

OF THE

JOINT COMMITTEE ON POSTAGE ON SECOND-CLASS MAIL MATTER AND COMPENSATION FOR THE TRANSPORTATION OF MAIL

AUGUST 31, 1914

SIXTY-THIRD CONGRESS
SECOND SESSION



AUGUST 31, 1914.—Referred to the Committee on the Post Office
and Post Roads and ordered to be printed

WASHINGTON
GOVERNMENT PRINTING OFFICE
1914

**JOINT COMMITTEE ON POSTAGE ON SECOND-CLASS MAIL MATTER
AND COMPENSATION FOR THE TRANSPORTATION OF MAIL.**

CONGRESS OF THE UNITED STATES.

JONATHAN BOURNE, Jr., *Chairman.*

HARRY A. RICHARDSON.

JOHN H. BANKHEAD.

JAMES T. LLOYD.

WILLIAM E. TUTTLE, Jr.

JOHN W. WEEKS.

ROBERT H. TURNER, *Secretary.*

RICHARD B. NIXON, *Disbursing Officer.*

TABLE OF CONTENTS

LETTER TRANSMITTING REPORT TO COMMITTEE . . .	
REPLIES OF MEMBERS OF COMMITTEE	
INTRODUCTION	
CHAPTER I.—Explanation of construction and draft	
Postmaster General to readjust the compensation	
panies for the transportation of mail	
Standardization desirable	
Construction of rates	
Relation of mail to passenger service	
Terminal charges	
Line rates	
Future investigations provided for	
Expenditures under committee plan	
Side and transfer service	
Service compulsory	
Fixed, not maximum rates	
Committee bill	
Comments on provisions of bill	
CHAPTER II.—Historical review of previous investi-	
gation of railway mail pay and résumé of testimony and argu-	
ment	
Investigations by former commissions	
The Hubbard Commission (1878)	
Elmer-Thompson-Slater Commission (1883)	
Wolcott-Loud Commission (1901)	
Hitchcock plan (1911)	
Expense of postal investigations	
Progress of the work of this joint committee	
Department plan modified	
Dead space	
Allowance for capital charges	
Short-line railroads (Talbott bill)	
Buckland plan	
Briefs	
Brief submitted by railroads (June 26, 1913)	
Reports of M. O. Lorenz and R. H. Turner	
Mr. Lorenz's report	
Mr. Turner's report	
Post Office Department's brief (Jan. 16, 1914)	
Executive sessions (Jan. 20 and Feb. 2 and 3, 1914)	
Department's third plan—A tentative draft of su-	
ggestion for legislation and regulation of railroads	
compensation therefor (Feb. 12, 1914)	
Hearings reopened	
Railroads' reply brief (Feb. 26, 1914)	
Railroad companies oppose the Post Office Depa-	
rtment's plan (Mar. 16, 1914)	
Post Office Department's reply to the railroads (	
Final hearings	
(1) Express	
(2) Authorizations of car service	
(3) Dead space	
(4) Overpay or underpay	
Car-mileage estimates	
Passenger, Pullman, express, and mail revenue	

	Page
CHAPTER III.—The weight basis, its defects—The space basis.	59-64
Present weight rates.	60
Present railway post-office-car rates	61
Comparison of audited revenues and expenditures.	61
Defects of present system.	61-62
Space as a substitute for weight.	62
Advantages of space basis.	64
CHAPTER IV.—The department's claim that railroads are overpaid for carrying mail—Its four suggested plans.	65-74
Original Hitchcock plan.	65-7
Tentative draft of proposed law for regulation of railway mail pay.	65-6
Capital charges disregarded.	66
Discussion of plan invited.	68, 69
Erroneous treatment of mail space.	68, 74
Department submits a second plan.	70-71
Tentative draft of proposed law for regulation of railway mail pay.	70-71
Department submits a third plan.	72-73
A tentative draft of suggestions for recommendation for legislation and regulation of railroad mail service and compensation therefor.	72-73
Fourth departmental plan (H. R. 17042, Union Calendar No. 243).	73-74
Departmental rates confiscatory.	74
Dictatorial power desired.	81-2
The commercial basis.	82-4
CHAPTER V.—What is a reasonable and just rate rate for transporting mail by railroad.	85
Passenger revenues a fair basis for comparison.	85
Mail and passenger car-mile earnings.	85-6
Desirability of universal rate.	85-7
CHAPTER VI.—Comparison of mail and express earnings.	90-1
Comparative earnings on a space basis.	91-1
1. Comparative earnings.	91-1
2. Comparative earnings on a ton-mile basis.	91-1
3. Comparison of rates per 100 pounds and per packages of lower weight.	92
4. Comparison on basis of increase in earnings.	92
CHAPTER VII.—Comparison of earnings from passenger and mail traffic.	95
Mail traffic-passenger traffic compared.	95
Baggage-car rates.	97
CHAPTER VIII.—Comparisons with the Pullman service.	100
CHAPTER IX.—Analysis of the bill prepared by the joint committee.	100
Round-trip authorizations provided for.	100
Relatively higher rate for short hauls.	101
Explanation of rates.	101-1
CHAPTER X.—Government ownership of R. P. O. cars.	105
Would increase expense.	106
Unwise as public policy.	109
CHAPTER XI.—Inadequacy of departmental data.	111
Departmental vacillation.	112
Numerous inconsistencies disclosed.	114
Better accounting system needed.	116
CHAPTER XII.—Delegation of discretionary power.	117
The divisor order.	117
Blue-tag order.	118
Discontinuance of parcel-post stamps.	119
Autocratic power sought.	119
Bureaucracy gone mad.	119
CHAPTER XIII.—Conclusion.	121
APPENDIX.	123

LETTER OF TRANSMITTAL.

WASHINGTON, August 1, 1914.

To the Joint Committee on Postage on Second-class Mail Matter and Compensation for the Transportation of Mail:

GENTLEMEN: On May 28, 1914, our committee adopted the following resolution:

Resolved, That the chairman be authorized by the joint committee to prepare the report of the joint committee.

The extreme technicality of the subject, the desirability of making a presentation clear to the layman and at the same time convincing to the statistician and specialist, has made the task a most difficult one. If I have seemed slow in complying with your request, it has been because of my earnest desire that when our report should be presented to Congress it shall contain an analysis of the vast amount of data that has been accumulated, and shall present concisely, yet comprehensively, the plan we have agreed upon and the facts and arguments which led to our conclusions.

I feel that, under all the circumstances and difficulties that we have had to contend with, the work of our committee has been remarkably expeditious and that we have well performed the duties placed upon us by Congress as far as "compensation for the transportation of mail" is concerned.

The actual work of our committee began in January, 1913, although in September preceding, immediately after the creation of our joint committee, I personally arranged for the collection of some of the information for the use of the committee. Our official investigation has, therefore, covered a period of nineteen months, which doubtless seems long to those unacquainted with our work, and was perhaps six months longer than the members of the committee believed it would take to complete the task.

Our work has been made much more difficult than I anticipated it would be, because of the very remarkable lack of definite and reliable statistics in the Post Office Department and in railroad offices regarding railway mail pay questions. As you are well aware, most of the statistics submitted by the department were in the nature of estimates, some of which were changed a number of times. We have not, therefore, had the assistance we had a right to expect from an administrative branch of the Government presumed to be under the charge of specialists.

Moreover, when this committee began its work it had before it a plan proposed by the Post Office Department, and recommended as "scientific and businesslike." The department subsequently modified its plan in many particulars and then entirely abandoned it, substituting a new plan in February of this year. Its third plan was also

discarded, or greatly modified, in its approval of H. R. 17042, introduced in the House of Representatives on June 5, 1914, and, if I am correctly informed, it has again changed its position by approving an increase in the rates contained in said H. R. 17042. While the department has appropriated in its plan presented in February, and still further absorbed in H. R. 17042 some of the vital bases which our committee had worked out, yet, if H. R. 17042 should be enacted into law some of the requirements are so pernicious as to destroy the benefits which I believe would result from the adoption of our plan.

The vacillating attitude of the department itself, as well as the unreliable departmental and railroad statistics, is largely responsible for the unexpected amount of time we have been obliged to devote to our study of this subject. On May 14, 1913, this committee considered its hearings concluded, but at the request of the Second Assistant Postmaster General granted the department permission to file a brief, which brief the committee expected to receive not later than the first of June, 1913. The brief was not filed, however, until more than six months later, to-wit, January 21, 1914.

On March 7, 1913, immediately after the inauguration of the present administration, I addressed a letter to the new Postmaster General, Hon. A. S. Burleson, directing his attention to the original and modified plans for railway mail pay advocated by his predecessor, and asked him to inform this committee whether he indorsed either of those plans; and, if so, which. Mr. Burleson replied immediately that he would give the subject prompt attention. More than 11 months elapsed, however, before I received Mr. Burleson's letter of February 12, 1914, informing the committee that the department had changed its attitude and submitting a tentative draft of a new plan.

The issues presented and the change of attitude of the department made it desirable to reopen the hearings, and this the committee did, beginning February 26, 1914, and closing April 3, 1914.

It is generally agreed among students of the subject that this committee has gathered the most extensive data ever brought together on the subject of railway mail pay, same occupying more than 1,650 printed pages, as presented in our preliminary report of January 24, 1913, and our printed hearings, commencing on January 28, 1913, and concluded on April 3, 1914, and which as printed from time to time were distributed to Members of Congress.

While I recognized the desirability of an expeditious conclusion of our work, I believed it more important that we should do our work thoroughly than that we should conclude it quickly. I should regret extremely and be deeply humiliated if our investigation had resulted, as did that of the Post Office Department, in our changing our attitude three times and advocating four radically different measures. We should certainly forfeit all claim to the confidence of Congress if we presented such a record of vacillation as did the department. If, in our anxiety to be expeditious, we had repudiated three plans we had evolved, upon what theory could we expect Congress to believe that we would for any considerable length of time, continue to advocate any new plan we might recommend?

I have been working continuously with such assistance as was available in the formulation of this report. To segregate the vast amount of information, to weigh the value of the various estimates of

AUGUST 21, 1914.

HON. JONATHAN BOURNE, JR.,

Chairman Joint Committee on Postage on Second-Class

- *Mail Matter and Compensation for Transportation of Mail,
Washington, D. C.*

DEAR MR. CHAIRMAN: In signing the report made by the Joint Committee on Postage on Second-Class Mail Matter and Compensation for the Transportation of Mail, which I have done, I wish to have this letter included to indicate that I am not entirely in sympathy with some of the strictures of the Post Office Department and its employees which the report contains. This especially applies to paragraphs on pages 19, 31, 81, 111, 112, 113, 114, 115, 116, 117, 119, and 121.

It is undoubtedly true that the Post Office Department undertook the study of the railway mail pay question just as the railroads did, without having at hand suitable information on which to base a conclusion, and it has only been through long and scrutinizing hearings which have been given by the commission that both of these elements have reached conclusions which it may be assumed are sound.

I do not think the present employees of the Post Office Department are entirely responsible for this condition, and I am not disposed to charge lack of good faith against the officers of that department in the reports which they have submitted to Congress at different times, as well as those to the commission, although I am confident that the department originally and perhaps down to the present time has approached this important question in a manner which induced attempts to demonstrate the contention that the railroads were receiving more pay than was justified by the service which they were performing. This is not unnatural, however, because it is the duty of the Government's officers to conduct all service at as low a cost as possible, but from the standpoint of the impartial observer the tendency to reduction of pay has been more marked than fairness would seem to warrant. It must be remembered that the department has been in the position of an advocate of the Government's interests while of course the railroads have been in a directly opposite position, each hoping that they would gain something by the evidence which they, from time to time, submitted to the commission.

Yours, very truly,

JOHN W. WEEKS.

INTRODUCTI

*To the Senate and House of Representatives
America in Congress assembled:*

The Joint Committee on Postage and Pay for the Transportation of Mail submits the following report on compensation for the transportation of mail.

Because of the extreme technicality of the subject, the impression that the railroads have been given by the Government for transportation of mail, we deem it necessary to submit an exhaustive report, in which we may subject the subject to repetition.

We are confident we have worked out a reasonable plan, herewith presented in the sections of which are so correlated that it is unnecessary for it to be adopted as a whole, or to be substituted from such legislation. The elimination or modification of same will materially affect the bill following the enactment of the bill.

After submitting our explanation of it therefor under Chapter I, we will submit chapters dealing with various phases of the subject.

Chapter II. A historical review of the subject of railway mail pay and a résumé of the reports submitted before our joint committee.

Chapter III. The weight basis and its distribution.

Chapter IV. The department's claim for compensation paid for carrying mail.

Chapter V. What is a reasonable and just compensation for the railroads?

Chapter VI. Comparison of mail and express rates.

Chapter VII. Comparison of earnings and expenses of the railroads.

Chapter VIII. Comparison of mail and express rates.

Chapter IX. Analysis of the bill prepared by the committee.

Chapter X. Government ownership of the railroads.

Chapter XI. Inadequacy of departmental compensation.

Chapter XII. Delegation of discretionary powers.

Chapter XIII. Conclusion.

In an appendix to the report is presented a statement of all the expenditures made from the appropriation for the use of this committee. The total for the year 1914, were \$6,560.50, leaving a balance of

American people; will minimize the possibility of any injustice being done to either party in interest, the Government or the railroads; avoid temptations to either party in interest to deplete or pad the mails during weighing periods and tend toward standardization of the service and development of desirable economies in administration.

The substitution of space for weight as the measure of the service rendered in railway mail transportation has appealed for many years to many students of the subject and has been several times suggested though never adopted.

From the beginning of our study the desirability of substitution of space for weight strongly appealed to our committee, and our effort has been to work out a plan practical of application and administration.

Our first effort was to work out a general plan; our second, to work out rates under the plan that would give just compensation for the services rendered.

Recognizing the dangers of our present tendency toward a government by rule and regulation instead of a government by law, our committee successfully endeavored to construct a bill without any authorization of departmental power to create rules and regulations, which too frequently result in the vetoing of congressional action or the emasculation of the purposes intended by Congress in its legislation.

Early in our study we realized the lack of reliable data and information based upon operation on the part of the Post Office Department, the Interstate Commerce Commission, and the railroads themselves, and recognized the fact that we would have to make an independent study of our own, which presented great difficulties because of the extreme technicality of the subject. We deemed it wise to secure the services and cooperation of the best obtainable statistician in order to check the figures and data presented by both the Post Office Department and the railroads. We all deem ourselves extremely fortunate in our ability to arrange with the Interstate Commerce Commission that we might have intermittently, and exclusively for a period of three months, the services and cooperation of Mr. M. O. Lorenz, associate statistician of said commission, and we desire to thank the Interstate Commerce Commission for its courtesy, and to express to Mr. Lorenz our appreciation of his assistance and our admiration for the ability he has shown, the fairness he has evinced, and his breadth of horizon.

After several months study of our subject Mr. Lorenz made a suggestion, the value of which strongly appealed to our whole committee, namely, the establishment of two charges for railway mail transportation, one a terminal charge and the other a line charge. The adoption of these two charges will greatly equalize the present inequality in payments between the short-line railroads as compared with the trunk lines. This same principle was recognized in the construction of the parcel-post bill, where the pick-up and delivery charge was one charge and the transportation was the other. We therefore adopted and strongly recommend to Congress our plan of two charges, for the reason that the relative cost of reception and delivery of mail at terminals, depots, or stations on railroads is the same, regardless of the distance that the mail may be hauled, while the second or line charge varies according to the distance the mail is hauled.

STANDARDIZATION DE

As business men, we all realized the establishing one unit or yardstick and So we adopted a 60-foot car, inside measurement, and at Mr. Lloyd's suggestion and study, we adopted 30-foot and pouch mail as our subunits. Adopting greatly to standardize both the postal and there is an enormous economic waste in well as in all transportation, through lack

Under existing law and methods the Government an odd number of feet in the apartment roads receive no extra compensation in where less than 40 linear feet of space is required for. The department may call for as much as 40 feet as it may see fit without any Government or compensation to the railroad principle, as there is no incentive for internationalization of the mail service, and in the interest, the railroads.

Under our suggested plan a mutual understanding between the Government and the transportation odd sizes will be rapidly changed into standard and storage cars, and 30 and 15-foot apartment cars. The Government will know what standards the railroads on hand, be able to adapt their mail movements, and the railroads will know what empty or available space in the apartment cars, so that they can more efficiently handle the business and utilize space not taken by the mail service under existing law and conditions.

The problem of the pouch service was became convinced that taking subunits of 30 feet measurement, and 3 linear feet, inside measurement, would enable the department to economize

The Postmaster General is made the standard by which of these units or subunits the Government protects its mail movements, thus protecting absolutely the railroads a contemporaneous action is made by the Government and further any service, vitalizing the department in the case called for unnecessary space it would be a reflection on postal management.

CONSTRUCTION OF R

Having decided upon space as the measurement—60 linear feet car, inside measurement—upon which to construct our rates, with 30 feet measurement, for apartment and storage cars, and 7 and 3 linear feet of space, inside measurement, to handle the pouch mail—we entered into our rates, which under our plan would render no compensation to the railroads for the performance by the Postmaster General.

Rate making is in its infancy, as evidenced by the general impression of students of the subject that cost ascertainment are prerequisites for scientific rate making. The Interstate Commerce Commission is bending its energies toward the development of an intelligent, universal plan of cost ascertainment and apportionments. No satisfactory separation has been made between freight and passenger operating costs. Nearly all mail is carried on passenger trains. Hence, with the lack of reliable data and the resultant necessity for the establishment of many arbitraries, in case our committee tried to work out specific rates dependent on passenger or other movements, the committee, as we progressed in our study, became more and more convinced of the necessity of tying our mail rates to and constructing them on the present average passenger car-mile revenue, which may be assumed to be ample and reasonable, as nearly every State has a railroad commission, and the passenger rates have stood the tests of legislatures, railroad commissions, and courts.

RELATION OF MAIL TO PASSENGER SERVICE.

Mr. Bourne advanced the proposition that the main desiderata in mail transportation by railroads are frequency, regularity, speed, and safety of the service; that the volume of passenger traffic determines and primarily controls the frequency, speed, and regularity, and, to a great extent, the safety of railroad passenger transportation. Hence, everything that is necessary for or tends to increase the volume of passenger traffic must be a relatively corresponding benefit to the mail in its transportation over the railroads, and, therefore, the Government should pay its relative proportion of same. That is to say, if the mail were 2 per cent of all passenger business, then the mail should bear 2 per cent of any cost incurred in the passenger service or expended for increasing the volume of the passenger traffic. In fact, Mr. Bourne believed that, if anything, the railroads should receive a higher car-mile revenue for mail transportation than for passenger service, because, while apparently the railroads make up their passenger-train schedules, yet, under postal regulations, the mail movements interfere with these schedules, as is shown by section 1354 of the Postal Laws and Regulations, 1913, reading as follows:

A mail train must not pull out and leave mails which are in process of being loaded on the car or which the conductor or trainman has information are being trucked from wagons or some part of the station to the cars.

Delays of mail trains over roads having frequent train movements must not only seriously affect the public but cause additional expense to the railroads because of interruption or suspension of other train schedules. Trains may depart leaving delayed passengers in the depot, but must not depart leaving delayed mail in the depot. While realizing that mail movements are more important than individual passenger movements, yet, in comparing the two services, these requirements or facts should be taken into consideration.

We have been surprised that representatives of the railroads have not brought out more clearly this fact and presented our committee with concrete instances and demonstrations as to the additional expense incident to such occurrences.

four passenger-train switch movements, in the cost of which each 60-foot car should pay its full quota; a 30-foot car one-half; a 15-foot car one-quarter; and 7 and 3 feet for pouch mail in baggage cars seven-sixtieths or three-sixtieths of such expense, respectively.

In the mail movements for R. P. O. storage and apartment cars there is a minimum of two, although sometimes several more, switching movements in addition to the regular four passenger movements. This is due to the department's frequently requiring railroads to have these cars on the tracks in the depots prior to the making up of the passenger trains to permit the loading and frequently the distribution of mail in these cars at stations. Hence the mail should be charged with two extra full-switch movements regardless of whether the car is a full 60-foot or a 30 or 15-foot apartment or storage car, as the railroads in their utilization of their 30 feet of a 30-foot postal apartment car or their 45 feet of a 15-foot postal apartment car have no occasion for and receive no benefit from these two extra switchings.

The Interstate Commerce Commission has frequently approved switching charges of \$3 or more, although many rates lower than this are on file with the commission. After considering these rates, noting the difference between freight and passenger switching and also making some inquiry into the actual movement of switch engines and crews in switching mail cars, we suggest the adoption of \$1.25 as the basic charge for each switch movement.

On passenger train round-trip movements there are two cleanings of cars; one prior to the start of the train and one at the end of the single-trip movement prior to its return. We sought information from many roads regarding cost to them of the cleaning. From the information received, which differed very materially on different routes, we computed an average which gave a result of 3 mills per mile run and, taking the department's estimate as to the average run of R. P. O., apartment, storage cars, and pouch mail to be 227.8 miles, we found the average 60-foot car-mile single-trip cleaning cost to the railroads, according to their returns, to be 68 cents per car. In view of the doubt in our minds as to the absolute reliability of this deduction, because of the lack of complete data upon which to base same, in constructing our rates we adopted 50 cents for a 60-foot car for each single-trip movement, or \$1 for a round-trip movement as the cost of cleaning a mail car.

Thus we have for the terminal charge on our standard or yard-stick, a 60-foot car, six switching movements at \$1.25 each, or \$7.50 for a round trip and \$1 for two cleanings for the round trip, or \$8.50 for the round trip terminal charge; for the 30-foot apartment or storage car two full mail switching movements and one-half of four passenger movements, or the equivalent of a total of four full switching charges, making \$5 plus 50 cents, this latter being one-half of the cleaning cost for a full 60-foot car in a round-trip movement, making \$5.50 as the round-trip terminal charge for a 30-foot car; for a 15-foot apartment or storage car we have two full mail movement switching charges and one-fourth of the four passenger switching charges, making three full switching charges, or \$3.75 plus one-fourth of the cleaning charge on a 60-foot car, or 25 cents, making a

we have given to the subunits the benefit of fractions in our suggested and recommended line rates, which are as follows:

Class of service:	Line charge per unit mile run.
60-foot R. P. O. car.....	cents... 21
Storage cars.....	do... 21
30-foot apartment.....	do... 11
15-foot apartment.....	do... 6
Closed pouch:	
7 feet.....	do... 3
3 feet.....	do... 1½

The adoption of our suggested terminal and line rates will give an average 60-foot car-mile mail revenue to the railroads of 24.69 cents as will be seen from study of the following table, prepared by Mr. Lorenz:

Joint committee rates on 60-foot car basis.

Unit.	Rate per unit.		Average distance as tabulated. ¹	Average rate on 60-foot car basis.					
	Terminal (round trip).	Line.		Terminal (single trip).	Line.	Terminal and line combined.			
						For average distance.	For 100 miles.	For 1,000 miles.	
		<i>Cents.</i>	<i>Miles.</i>		<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	<i>Cents.</i>	
60-foot R. P. O.	\$8.50	21.00	301.0	\$4.25	21.0	22.41	25.25	21.42	
60-foot storage	8.50	21.00	554.0	4.25	21.0	21.76	25.25	21.42	
30-foot apartment	5.50	11.00	185.0	5.50	22.0	24.97	27.50	22.55	
15-foot apartment	4.00	6.00	80.5	8.00	24.0	33.94	32.00	24.80	
7-foot closed pouch	1.00	3.00	34.5	4.29	25.7	38.13	29.99	26.13	
3-foot closed pouch	.50	1.50		5.00	30.0	44.49	35.00	30.50	
All units					21.82	24.69			

¹ Average distances (especially in case of 60-foot R. P. O.'s) are too low because tabulation was made by R. P. O. routes and not on the operating run of the cars. If the 60-foot R. P. O. average run is 400 miles, the 22.41 would be changed to 22.06 cents.

Adoption of our suggested plan and rates will result in increasing the compensation of many of the short-line roads and decreasing the compensation of some of the trunk lines.

FUTURE INVESTIGATION PROVIDED FOR.

Because of the belief on the part of some of the committee that our line rates, especially the base rate of 21 cents for a 60-foot R. P. O. car or for a 60-foot storage car is too low, and because of our full realization of the meagerness of some of our information and the possible unreliability of other information, although we have made every effort to check same, we have included in our suggested bill section 7, giving both parties in interest, the Government, through the Post Office Department, and the railroads, when 25 per cent of the mileage of the roads carrying the mail so desire, an opportunity of initiating another ascertainment whereby Congress could have presented to it by the Interstate Commerce Commission information secured after two years' actual operation of our plan. If both the Postmaster General, representing the Government, and the representatives of over 75 per cent of the railroad mileage carrying the mail believe we have been fortunate enough to work out a plan at rates equitable to

both parties in interest the people will be to any further investigation of the subject master General or railroads representing age carrying mail believe that an just avenue for determination is provided made operative until after two years act our plan be enacted into law, we are unan this would be a necessary period of ope valuable additional information.

Although in our study of this problem mated that the Post Office Department v that increased railway mail pay, we hav increasing or decreasing railway mail pay upon the duty placed upon us by congress we felt that Congress intended to appoint vey to it the wishes, directions, or threat Office Department. We have felt our sol the material available, an exhaustive, ca and present to Congress such data as we ideas as we might be able to evolve, tog and rates, with our reasons for our recom their adoption. This we are doing in this

EXPENDITURES UNDER COM

Realizing that the American people are should have all information bearing direct ject of this magnitude and importance, table, prepared by Mr. Lorenz, showing v probably be required under the adoption

Estimated compensation at rates recommen

Unit.	Number of round trips. ¹	Terminal rate.	Terminal compensation. ¹	Line u miles
60-foot R. P. O.	171,915	\$8.50	\$1,461,278	103,546
30-foot R. P. O.	448,011	5.50	2,464,060	165,418
15-foot R. P. O.	467,617	4.00	1,870,468	75,315
Storage cars.	45,573	8.50	387,371	50,685
Closed pouch 7-foot ²	596,496	1.00	596,496	41,204
Closed pouch 3-foot ³	1,789,484	.50	894,742	123,613
Total.			\$7,674,414	

Less land grant deduction (using 1.925 per cent as in letter of May ant Postmaster General to Hon. J. T. Lloyd)

To be paid to railroads exclusive of side and transfer service
Estimated by department for side and transfer service

Estimated by department for freight shipments

Estimated cost to department (the increased space during t by probable economies)

¹ The number of trips are as tabulated, but this is known to be basis of R. P. O. routes instead of car runs. Thus a car from Wi be charged with only one round trip terminal allowance, but in sions, this was taken as three trips. This would not affect the l terminal charges.

² All units prorated to a 60-foot car-mile basis aggregate 266,73- ment without land grant deduction of 24.69 cents per car mile and s

³ Closed-pouch service taken as consisting of 25 per cent 7-foot probably overestimates the proportion of the 7-foot units, as pouch is too large.

It will be noted that the department's estimate for side and transfer service now performed by the railroads, but under our suggested bill to be either performed or paid for by the Government, was \$2,118,820. The committee does not concur in the soundness of this estimate, as in our hearings it developed that the actual out-of-pocket expense to the railroads, according to the testimony of representatives of the Pennsylvania and Missouri Pacific Railroads, based on ascertained information, and the application of same to all other roads, would be less than \$500,000. Our committee believes that the department would readily be able to make contracts with the railroads to continue performing this service provided a reasonable profit were allowed them in addition to the out-of-pocket cost. For this reason our committee is of the opinion that a million dollars would be a most liberal estimate for the expense of the Government in its own performance or payment for side and transfer service.

The foregoing table of Mr. Lorenz's estimated compensation under rates suggested by our joint committee is based on the department's estimate as to the amount of car space it will require for the fiscal year 1915 in handling mail. It will doubtless be found, should our suggested plan be adopted, that when desirable economies are practiced and the department familiarizes itself with its practical operation, less space will be required than estimated by the department. Should the department's estimate exceed the actual requirements to the extent of 3 per cent, that would make a reduction of practically \$2,000,000 in the amount of actual money that the railroads would receive under Mr. Lorenz's estimate. We are confident that the total cost to the Government under the adoption and operation of our plan would certainly be less than \$65,000,000 per annum instead of the \$67,429,013 computed by Mr. Lorenz on the basis of the department's estimates as to the space that will be required and the amount necessary for the Government to pay for side and transfer service. The Post Office appropriation bill, approved March 9, 1914, carries for the fiscal year 1915 a total of \$62,110,000, made up as follows:

For inland transportation by railroad routes.....	\$56, 188, 000
For pay of freight or expressage, etc.....	510, 000
For railway post office car service.....	5, 412, 000
Total.....	\$62, 110, 000

Therefore our suggested plan and rates, if adopted, will not increase by more than \$3,000,000 the appropriation for railway mail pay in the last Post Office bill.

SIDE AND TRANSFER SERVICE.

Under our suggested plan, the railroads are rightly relieved of or compensated for what is known as "side" and "transfer" service. It is no more reasonable or just to compel the railroads to deliver mail to a post office after it reaches the depots or terminals than it would be for the Interstate Commerce Commission to require railroads to furnish taxicabs free of cost to take passengers to their homes on arrival at their destination depots, or motor trucks to move freight from the freight terminals to the consignees at the expense of the railroads. Hence, we provide in our suggested plan for the relief of the railroads from this unjust burden now placed upon them

and authorize the Postmaster General to make separate contracts for this service.

We recommend the continuance of the present plan of making a reduction of 20 per cent in pay to land-grant railroads. The contention of some of the land-grant roads that they should receive full payments does not appeal to us as sound. The roads accepted the conditions when they accepted the benefits incident to the land grants and, in our opinion, the 20 per cent reduction should continue.

SERVICE COMPULSORY.

We include section 9 in our suggested bill, believing that Congress has the right to compel the railroads to transport the mail, and that the railroads should be required to perform this service provided they receive reasonable compensation for the service rendered, as the cessation or interruption of mail movements by any refusal on the part of railroads to carry mail would work incalculable injury to the business and general welfare of the country.

FIXED, NOT MAXIMUM RATES.

In our suggested bill we purposely make our rates fixed, and not merely maximum, leaving no discretionary power to the Postmaster General to autocratically change the same. We assert that it would not only be most unjust, but destructive of confidence in our Government and unparalleled in rate making for Congress to fix the maximum rates and delegate to the Postmaster General the right to determine the minimum rates, he as the Government's representative being the shipper in mail transportation.

We have spent nearly two years in this study, have conscientiously and to the best of our ability endeavored to perform the duties placed upon us by Congress in its creation of our committee. We feel confident we have worked out a sound, scientific, and simple plan. We believe our suggested rates are certainly not too high from a governmental standpoint though they may be too low from a railroad standpoint. They are as near equitable as we can demonstrate by means of the data available. We herewith respectfully submit a concrete bill, so correlated that it should be adopted in its entirety. *The elimination of any of its features, or modifications of same, will in our opinion materially affect the benefits incident to the adoption of the bill as a whole.*

COMMITTEE BILL.

A BILL Authorizing and directing the Postmaster General to readjust the compensation of steam railroad companies for the transportation of mail.

SECTION 1. From January first, nineteen hundred and fifteen, or from an earlier date if practicable, the Postmaster General is authorized and directed to readjust the compensation to be paid steam railroad companies for the transportation of mail on passenger trains, mixed trains, mail trains, or cabooses of freight trains, and for services connected therewith at the rates hereinafter named: *Provided*, That where two or more railroads have varying distances between the same points, the compensation for the longer distances may be reduced to that of the shortest distance by mutual agreement between the Postmaster General and the railroad companies.

SEC. 2. The Postmaster General may authorize mail service of the following five classes, namely: Full railway post-office car service, apartment railway post-office car service, storage-car service, closed-pouch service, and side and transfer service.

Full railway post-office cars and storage cars shall be of a standard length of sixty feet, inside measurement: *Provided*, That thirty or fifteen feet of space may be authorized for the round trip in baggage cars, at the respective rates hereinafter named for thirty or fifteen foot apartment cars. Apartment cars shall be of two standard lengths, namely, thirty feet and fifteen feet, inside measurements. Closed-pouch mail service shall be the transportation of mail in pouches, bags, or hampers in custody of railroad employees on trains on which no full railway post-office cars or apartment cars are authorized. Closed-pouch service may be authorized in units of three linear feet or seven linear feet, inside measurements: *Provided*, That not more than seven linear feet of space shall be authorized on any one train at the rates hereinafter specified for closed-pouch service. Side and transfer service shall be the transportation of mail between railroad stations and post offices supplied therefrom and between railroad stations.

Authorizations of railway post-office cars, apartment cars, and storage cars herein provided for shall be for the round trip of the car and the maximum space authorized in one direction shall be determinative of the space to be paid for in the opposite direction, unless otherwise agreed upon between the Postmaster General and the railroad company in any particular case: *Provided*, That authorizations may be changed only at points where the switching of cars into or out of trains would not delay the running of such trains: *And provided further*, That not more than one apartment car shall be authorized on any one train. Authorizations for mail service under this act may be made upon any passenger or mixed train scheduled for public use, or upon the caboose of any freight train, and fast-mail trains may be contracted for at rates not exceeding those hereinafter named.

SEC. 3. Service by railway post-office, apartment, and storage cars shall include the carriage therein of all mail matter, equipment, and supplies for the mail service: *Provided*, That the Postmaster General is authorized to return to the mail, when practicable for the utilization of car space paid for and not needed for the mails, postal cards, stamped envelopes, newspaper wrappers, empty mail bags, equipment, and other supplies of the postal service. The rates fixed by this act shall also cover the transportation of persons who are discharging official duties in connection with the Railway Mail Service. Such persons shall include clerks handling mail in cars, clerks traveling from their homes to the beginning of a mail run to which they have been assigned or to their homes from such mail run, and all other persons while discharging official duties as inspectors or supervisors of the Railway Mail Service or in any other manner assigned to duty in the administration of such service.

The rates provided for herein shall further cover expenses of delivering within and receiving mails at car doors and the switching, lighting, heating, furnishing of suitable drinking water, and cleaning of mail cars. Railroad companies carrying the mails shall furnish reasonable facilities for caring for and handling them while in their custody. They shall furnish all cars or parts of cars used in the transportation and distribution of the mails, except as herein otherwise provided, and place them in stations before the departure of trains at and for such reasonable time as the department may require. They shall also provide reasonable station space and rooms for handling and transfer of mails in transit, and for offices and rooms for the employees of the Postal Service engaged in such transportation, when required by the Postmaster General.

SEC. 4. Standard specifications shall be prepared by the Postmaster General for the construction and fittings of full railway post-office cars, thirty-foot apartment cars, fifteen-foot apartment cars, and storage cars, and the rates herein named shall apply only to cars constructed and fitted in accordance with such standards: *Provided*, That whenever a railroad company is unable to furnish standard cars or apartments of the length requested, the Postmaster General may accept cars of lesser length if sufficient for the needs of the service, and pay only for the actual space furnished, the compensation to be a pro rata of that provided for by this act for the standard lengths requested: *And provided further*, That the Postmaster General may accept cars and apartments of greater length than those of the standard requested, but no compensation shall be allowed for such excess lengths.

SEC. 5. The rates of payment for the services authorized in accordance with this act shall be as follows, namely:

For full railway post-office car service, a terminal charge of \$3.50 for each round trip, or \$4.25 for each single trip, of a sixty-foot car, irrespective of the distance run, and in addition thereto a line charge at the rate of 21 cents per mile run.

For thirty-foot railway post-office apartment-car service, a terminal charge of \$5.50 for each round trip, or \$2.75 for each single trip, of a thirty-foot apartment car, irrespective of the distance run, and in addition thereto a line charge at the rate of 11 cents per mile run.

The proviso in this section is suggested in order that the department may be authorized to take advantage, should opportunity present itself, where railroads have different distances between the same points and the railroad with the longest mileage is willing to carry mail at the rate payable to the road with the shortest mileage. This provision covers the desirable competitive element and at the same time avoids any dictatorial power on the part of the department and holds inviolate the right and desirability of Congress itself determining rates.

Section 2. This section establishes and defines the classes of mail service that the Postmaster General may authorize; makes space the measure of the service rendered; a 60-foot car, inside measurement, the yardstick for the determination of the amount of service authorized and performed, with 30 and 15 foot subunits, inside measurement, or, respectively, half and quarter yardsticks with 3 and 7 linear feet subunits or divisions of the yardstick applicable only to closed-pouch service.

Side and transfer service are defined; authorizations of railway postoffice-cars, apartment cars, and storage cars are made mandatory for a round trip, unless otherwise agreed upon by the Postmaster General and a railroad company in any particular case. This provision seems just and sound. It is intended to make the department more careful in making authorizations, to insure the most economical and efficient mail movements, and at the same time give the railroads compensation where the cars might come back empty, and yet by mutual agreement gives the department and railroad an opportunity of permitting the railroad to utilize an empty car on a return trip, especially a storage car, for other transportation for which they might receive a higher rate than they would from the Government under the rates specified in our suggested bill. This makes an incentive beneficial to both the department and railroad and minimizes economic waste.

The suggested law specially provides that authorizations may be changed only at points where the switching of cars into or out of trains will not delay the running of such trains.

This is desirable and necessary for the protection of the public so that there shall be the least possible interference with transportation because of the supremacy given under the law to the right of way of mail over all other traffic, and our rates, especially the terminal rates, are scientifically constructed on the basis of the minimum switch movements for mail traffic.

Section 3. Contains definitions of the service expected to be performed. The first proviso permits the utilization of such portions of authorized space as may intermittently not be needed for the mails proper, for transportation of postal cards, stamped envelopes, supplies and equipment directly connected with the mail. This should save the Government considerable money.

The railroads also are to be compelled to carry, without extra charge, railway mail employees during the discharge of their official duties, but only those Government employees whose duties are directly performed in connection with the Railway Mail Service. The railroads should no more be expected to carry postal employees free of charge when not directly and officially connected with the Railway Mail

of the Postmaster General or representatives of the railroads with an aggregate mileage of at least 25 per cent of the total mileage of railroads carrying mail, to investigate the justice and reasonableness of the rates herein established. In the event that both the department and more than three-fourths of the railroads shall be content with these rates, they shall remain in force; no investigation will be necessary. Knowledge on the part of both the department and the railroads that an investigation may be called for at the end of two years will undoubtedly make both parties in interest more careful in keeping statistical records as to the operation of the law.

Section 8. This section we deem essential in order to provide for the punishment of railroads failing to perform services. The second clause of the section aids in preventing payment for services not rendered.

Section 9. Heretofore the law has not required railroads to carry mail. Theoretically, mail transportation is a matter of contract between the Government and each individual road. Practically, railroads have been compelled to carry the mail, as they could not withstand the public criticism which would follow refusal to do so. We believe that the Government should pay a reasonable commercial rate for the service it receives, and that when such compensation is tendered the railroads should be compelled to perform the service.

Section 10. This section makes existing appropriations under the present system of compensation available for use under the space basis if adopted.

INVESTIGATIONS BY FORMER COMMISSIONS.

Before entering into detail as to the work of the joint committee, a brief review of investigations had by former commissions into the subject of railway mail pay may be enlightening.

THE HUBBARD COMMISSION (1878).

SPACE, COST, AND SPEED.

Under the act of July 12, 1876, the President appointed a commission on railroad transportation of the mails, commonly known as the Hubbard Commission. This commission in April, 1878, reported in favor of a system in which space, cost, and speed were made the determining factors. (S. Mis. Doc. 14, 45th Cong., 2d sess.)

After an investigation covering two years, the Hubbard Commission reached the conclusion that the proper basis for determining what compensation should be paid the railroads was space and that on such basis the railroads should be paid the cost and a fair profit thereon.

Two reports were made, a majority and minority report, the opinion being expressed in the former that 10 per cent should be subtracted from the total operating expenses for passenger-train service on account of station and other expenses not applicable to the Postal Service and that 54.1 per cent be added to provide a return equal to that received by the railroads from the general public. The minority report, after taking the operating expenses of the railroads for passenger-train service and deducting 13 per cent therefrom for station and other expenses in which it was believed the Postal Service did not participate, added 45 per cent to cover fixed charges and interest on the investment.

The rates recommended in the majority report would have yielded 6.1 mills to 8.5 mills per linear foot of car space for speeds of 25 and 40 miles per hour, respectively, while those recommended in the minority report would have yielded 5.82 mills to 7.12 mills for speeds of 23 and 35 miles per hour, respectively.

The minority report also differed from the majority report in that it recommended authorizing the Postmaster General to ascertain every four years, or oftener, the average cost of running a passenger train measured by a linear foot and what percentage should be added thereto to give a fair profit to the railroads. The majority report made no recommendation in this respect.

Both reports contemplated a law authorizing the Postmaster General to determine the amount of car space required as measured by the quantity of mail carried.

It was recommended in both reports that the railroads should be relieved of side and terminal service and that, in case of differences between the railroads and the Post Office Department, such differences should be referred to a board of arbitration, to be authorized by Congress, for settlement.

ELMER-THOMPSON-SLATER COMMISSION

SPACE-WEIGHT AND SPEED.

Under the act of March 3, 1883, the Postmaster a commission commonly known as the Elmer-Thompson-Slater Commission. Under date of December 3, 1883, the report, which Postmaster-General Gresham presented to Congress on December 20 of the same year (H. R. E. Cong. 1st sess.). This report recommended a system of space, weight, and speed.

This was a departmental commission, consisting of the Assistant Postmaster General, the general superintendent of the Mail Service, and the superintendent of the Department of Adjustments.

They recommended that the basis of pay should be determined by taking a linear foot of car space as a unit and the frequency and speed with which the mail is conveyed; that the space factor should be determined by the Postmaster-General, modified by weight and frequency of the mail; and that the factor to be determined by the schedules of the mail service in connection with the official reports of the Railway Mail Service.

It was recommended that the Postmaster-General should increase or reduce the amount of space to be paid for, after a weighing had to determine whether a sufficient increase or diminution in the amount of space was on any railroad to warrant an increase or diminution.

For closed-pouch service they recommended a linear foot per mile run for 6 linear inches of space for 200 pounds of mail or less, but not less than \$35 per annum upon any route on which six-round trips per week were made by railway post-office cars at speeds ranging from 20 miles per hour to 30 miles per hour rates of 5 mills and 5.5 mills were suggested, and for each additional mile in excess of 30 miles per hour one-tenth of a mill additional. In the adjustment of railway post offices they recommended allowances for 500 pounds, daily average, to 60 feet for 8,000 pounds.

The commission found that the average earnings for train service was 26 cents per car mile. They concluded that if the railroads received 5 mills per linear car mile or at the rate of 25 cents for a 50-foot car at the rate of 25 miles per hour, they would be getting a rate commensurate to the returns from all passenger traffic combined and would be just and reasonable. They also recommended that the mail should be separated from railway transportation.

The commission also had in mind placing some restriction upon the exercise of discretionary and arbitrary power of the Post Office Department in making allowance for weight of the mails modified by the room necessary for the mails and distribute the same and the speed with which the mail is conveyed, would remove all possibility of improper allowances in determining the space and pay on any particular route.

To summarize, the commission was for a space measure, restricted and regulated by the weight carried, with a rate based upon the average train earnings for ordinary speeds and a higher rate for speeds above the ordinary.

WOLCOTT-LOUD COMMISSION (1901).

Under the act of June 13, 1898, a congressional Postal Service Commission was created, commonly known as the Wolcott-Loud Commission. This commission reported on January 1, 1901, reaching the conclusion that the prices paid to the railroad companies for the transportation of the mail were not excessive (S. Doc. No. 89, pt. 1, p. 19, 56th Cong., 2d sess.); and further, that the prices paid as compensation for the postal-car service were not excessive. With reference to space it says (p. 15 of the same report):

The commission, while recognizing that the question of "space" must be considered as having a strong influence upon the question of the reasonableness of the present railway mail pay, feels unwilling to recommend it as the controlling standard by which the rates of compensation for the transportation of the mails shall be fixed, because of the impossibility, with the evidence before the commission, of applying the "space" basis of payment to the carriage of the mails.

As to this, Mr. Loud, in a separate report, says:

Space, in my opinion, should be the basis of pay; and I reach this conclusion from the fact, which must be apparent to everyone who has made a careful study of this question, that space is the principal and therefore should be the controlling factor. (Id., p. 22.)

Again, on page 24 of the same report, he says:

There is not sufficient testimony before the commission, in my opinion, to recommend what rate should be paid for a given space, but the lack of such testimony results from the fact that the system of space payment was regarded generally by the commission as impracticable, and a proper investigation in that direction was not pursued.

HITCHCOCK PLAN (1911).

This now leads to a consideration of H. R. Document No. 105, Sixty-second Congress, first session, "A report giving the results of the inquiry as to the operation, receipts, and expenditures of railroad companies transporting the mails, and recommending legislation on the subject," and submitted to Congress by Postmaster General Hitchcock on August 12, 1911.

The authority under which this inquiry was conducted by the Post Office Department was the act of March 3, 1879, which reads as follows:

The Postmaster General shall request all railroad companies transporting the mails to furnish, under seal, such data relating to the operating, receipts, and expenditures of such roads as may, in his judgment, be deemed necessary to enable him to ascertain the cost of mail transportation and the proper compensation to be paid for the same; and he shall, in his annual report to Congress, make such recommendations, founded on the information obtained under this section, as shall, in his opinion, be just and equitable.

Although this law had been on the statute books for 28 years, no definite action was taken thereunder until 1907, during the administration of Mr. Cortelyou, when Second Assistant Postmaster General Shallenberger was directed to pursue the inquiry contemplated by the statute. The inquiry was continued by Mr. Meyer,

committee to postpone consideration until some future time. Hon. Jonathan Bourne, jr., then chairman of the Senate Post Offices and Post Roads Committee, was authorized to introduce the bill in the Senate, which he did on July 26, 1913. The bill was numbered S. 7371, and referred to the Senate Committee on Post Offices and Post Roads.

The compilation and tabulation of the information contained in the Hitchcock plan enunciated in House Document No. 105, Sixty-second Congress, first session, cost the Government approximately \$19,500, two specific appropriations of \$10,000 each having been made by Congress for that purpose. The railroads claim that in round numbers it cost them a quarter million of dollars to secure the information sought by the department.

The Hubbard Commission in its investigation expended \$16,000, \$10,000 of which being a specific appropriation and \$6,000 payable out of the postal revenue.

To cover the expenses of the Elmer-Thompson-Slater Commission the sum of \$10,000 was appropriated, payable out of the appropriation for "Inland transportation by railroad routes."

In the investigation made by the Wolcott-Loud Commission \$27,000 was appropriated to cover the expenses thereof, of which \$21,852.14 was expended.

EXPENSE OF POSTAL INVESTIGATIONS.

Below is given a statement, taken from a letter of Hon. Charles A. Kram, Auditor for the Post Office Department, dated February 21, 1914, and addressed to Hon. Jonathan Bourne, jr., showing the amount appropriated, expenditures, and the balance carried to surplus fund, for the commissions above named, together with that of three other commissions appointed to investigate postal subjects other than that of railway-mail pay:

	Appropriations.	Expenditures.	Balance carried to surplus fund.
Commission on railroad transportation of mails (Hubbard Commission):			
Act July 12, 1876 (19 Stat., 79).....			
1877.....	\$10,000.00	\$10,000.00	
Act Mar. 3, 1877 (19 Stat., 385), payable from postal revenues.....	6,000.00		
Departmental investigation of Railway Mail Service (Elmer-Thompson-Slater Commission):			
Act Mar. 3, 1883 (22 Stat., 455).....	10,000.00		
(This sum was payable out of the appropriation "Inland mail transportation, railroad routes," and no separate account appears to have been kept of the expenditures for this commission.)			
Postal Service commission (Wolcott-Loud):			
Act June 13, 1898 (30 Stat., 445).....	20,000.00		
Act Mar. 1, 1899 (30 Stat., 966).....	7,000.00	10,000.00	
1900.....		8,658.93	
1901.....		3,193.21	
1903.....			\$5,147.86
Joint commission on second-class mail matter:			
Act June 26, 1906 (34 Stat., 477).....			
1907.....	25,000.00	10,534.16	
1913.....			14,465.84
Joint commission on business methods of Post Office Department and Postal Service:			
Act Mar. 2, 1907 (34 Stat., 1217).....	75,000.00	15,000.00	
1908.....		50,661.01	
Act May 27, 1906 (35 Stat., 417).....			
1909.....	10,000.00	3,545.98	
1913.....			6,798.04

credit the railroads with the maximum space in both directions. The Postmaster General stated through his Second Assistant Postmaster General, the Hon. Joseph Stewart, and directly by telephone, that he was willing to make the concessions to the railroads in the respects indicated.

Shortly after the informal conference referred to, namely, January 6, 1913, the committee organized, and the chairman, after calling the committee's attention to the foregoing modifications in the departmental plan, was authorized to formulate a letter to Postmaster General Hitchcock, asking him to indicate in writing his recommendations, with his reasons therefor.

This letter was as follows:

JANUARY 6, 1913.

HON. FRANK H. HITCHCOCK,
Postmaster General, Washington, D. C.

MY DEAR GENERAL: Referring to telephonic conversation had with you several days ago, in which you stated that the department was willing to make certain concessions to the railroad companies in the matter of railway mail pay by modifying the position taken by it in House Document No. 105 and as expressed in the pending bill, S. 7371.

As I understand it, while approving in general the plan outlined in House Document No. 105, you are now prepared to recommend certain modifications of that plan in these particulars, to wit:

First. That the Interstate Commerce Commission instead of the Postmaster General be authorized to make the primary separation between passenger and freight business.

Second. That in the matter of car space the railroad companies be credited with the maximum space in both directions.

Third. That in addition to a compensation of 6 per cent of the operating expenses the railroad companies, after an apportionment, be credited with a reasonable percentage of the capital employed in and relating to the Railway Mail Service.

The joint committee organized this morning and is anxious to have you indicate in writing, at the earliest possible date, your recommendations modifying the plan as outlined in House Document No. 105, with your reasons therefor.

As prompt a response as the nature of this request will permit is desired.

Yours, very truly,

JONATHAN BOURNE, Jr.,
*Chairman Joint Committee on Postage on Second-class Mail
Matter and Compensation for the Transportation of Mail.*

In reply the Postmaster General sent the following telegram:

WASHINGTON, D. C., January 8, 1913.

HON. JONATHAN BOURNE, Jr.,
United States Senate, Washington, D. C.:

Your letter of to-day is accurate in its statement of the modifications I favor.

FRANK H. HITCHCOCK.

His formal reply to the chairman's letter of January 6 reads as follows:

POST OFFICE DEPARTMENT,
OFFICE OF THE POSTMASTER GENERAL,
Washington, D. C., January 9, 1913.

HON. JONATHAN BOURNE, Jr.,
*Chairman Joint Committee on Postage on Second-Class Mail Matter
and Compensation for the Transportation of Mail.*

MY DEAR MR. CHAIRMAN: Referring to your letter of the 6th instant regarding certain proposed modifications of the general plan outlined in House Document No. 105 for readjusting railroad mail pay, I have the honor to state that I am willing to recommend the following in connection therewith:

First. That the Interstate Commerce Commission, instead of the Postmaster General, be authorized to make the separation of operating expenses between passenger and freight services.

The CHAIRMAN. Such an allowance, by law or by the department, namely, crediting railroad companies with maximum space in both directions for all car space used, would rectify the discrepancy between yourself and the department as represented by the nonallowance for 13,546,378 car-foot miles on empty storage cars running, would it not?

Mr. BRADLEY. I believe so.

The CHAIRMAN. So that really the main difference between you and the department in the results obtained on the information contained in Document 105 is the difference in allowance or nonallowance for maximum amount of space for the round trip?

Mr. BRADLEY. So far as the space is concerned; yes, sir.

As to this, Second Assistant Postmaster General Stewart (Hearings, pp. 1014-15) makes the following statement:

The cases covered by Postmaster General Hitchcock's letter are not such cases as are involved in the difference between the results reached by the railroads' committee and the officers of the Post Office Department. * * *

This referred to cases where, because of a difference in the authorization of railway post-office cars in the two directions, a doubt had arisen as to whether under the new plan proposed the railroad companies would receive credit in both directions for the maximum space authorized in either direction. Its purpose was to remove all doubt upon this point and to agree that the rule should be written in the statute in order that it could not be questioned. It was not an admission that the allowances made in Document 105 had been erroneous in such cases.

The claim of the railroads was that the Post Office Department, in compiling its space figures contained in Document No. 105, provided for only the minimum necessities of the postal service, refusing—

to credit the mail service with much of the space thus required by the department, although his figures for the other passenger-train services allowed fully for all such space required by them. In fact, in many cases such space actually required by the mails, and so reported by the railways, was taken from the total mail space, and, without reason, assigned to the passenger service.

(Preliminary report, p. 13.)

The Post Office Department just as positively asserts "that the railroads companies generally reported the space at the maximum of operating conditions, whether warranted by the needs of the mail service or not." (Hearings p. 1017.)

What the Post Office Department did is described from the railroads' viewpoint by Mr. Bradley (Hearings, pp. 405-406) as follows:

The car space devoted to the mails, which the Post Office Department had refused to recognize or accept, had been deliberately transferred to the car space credited to the passenger service, thus changing the relative ratios of one to the other. The explanation of the Postmaster General was based upon a discrimination between car space directly used by the mails, and deemed absolutely necessary, and car space incidentally required in connection with the mails, the latter being denominated "dead space," and thus transferred to the passenger service. The fact is, that it is not dead space, but just as active as any other car space in the trains, and is just as much an attendant feature of the mail service as similar unoccupied space in the passenger or express cars is to those services, and which the railroad companies, of course, charge to either of those services.

What the Post Office Department did, from its viewpoint, may be gathered from the definition of "dead" and "deadhead" space given by Second Assistant Postmaster General Stewart (Hearings, p. 1380), which was as follows:

Speaking generally, and I will say that the record is more specific, dead space as it appears in Document 105, and as the subject of discussion here, is that space in cars reported by the railroad companies and charged to the mail service which the department determined was operated for the convenience of the railroad company without a necessary connection with the mail service, or space operated in excess of the authorization made by the department and operated for the convenience of the railroad company, or operated for some reason for which the department is not

responsible. In some cases it consisted of the operation of a full 60-foot car where the department asked for only 30 feet of space. Sometimes it represented the operation of a car beyond the terminus of an authorized line. In other cases, it represented the operation of a car over a rail line, where no mail service was authorized to be performed, and sometimes it was the operation of an apartment car over a line on Sunday where no railway post-office service was performed on Sunday, although performed on week days. Those cases the department determined were not properly chargeable to the mail service, and the space involved was designated as dead space and charged to the passenger service. Deadhead space is space which was operated by the companies in excess of the immediate needs of the service, but which the department believed the mail service was properly chargeable with as being incidental to the operation of the authorized service, as, for instance, where a 60-foot car was authorized in one direction and a 40-foot car in the opposite direction. If that necessitated the operation of a 60-foot car in each direction, it was thought that the mail service should be charged with the entire space both ways; therefore the additional 20 feet in the return movement was designated as deadhead space and charged to the mail service; that is combined with the mail space but set out separately so that Congress might know what the deadhead space amounted to in its relation to the rest of the service.

In connection with car-foot-mile concessions it may be well to refer to another aspect of the above-mentioned difference between the Post Office Department and the railroads. The department asserted that the railroads were receiving from their mail service a revenue of 4.14 mills per car-foot mile, and from their passenger service 4.16 mills. The railroads claimed that they were receiving 3.23 mills per car-foot mile from mail, and 4.35 mills from their passenger service. (Preliminary report, p. 11.) This discrepancy indicated to the railroads that the Post Office Department had excluded from the mailservice and charged to the passengerservices so-called dead space, which had no proper application to the latter service. They claimed in effect that if the dead space was to be excluded at all it should have been excluded from both services, so that the relative percentages of cost and revenue would not have been affected. The result of these differences was the creation of a departmental and railroad committee to ascertain whether same could be adjusted. By reference to page 324, of the Hearings, will be found a joint letter signed by the representatives of the respective interests, addressed to the chairman of this joint committee, wherein the earnings per car-foot mile in mail service are stated to be 3.37 mills, and in passenger service 4.34 mills, when dead space was counted as the railroads contended. This letter reads as follows:

MARCH 15, 1913.

HON. JONATHAN BOURNE, JR.,

Chairman Joint Committee on Postage on Second-Class Mail

*Matter and Compensation for the Transportation of Mail,
Congress of the United States.*

MY DEAR MR. CHAIRMAN: In response to the direction of the joint committee at its session February 12, 1913, the undersigned committees were designated by the Second Assistant Postmaster General and Mr. Ralph Peters, chairman committee on railway mail pay, to represent the Post Office Department and the railroads, respectively, to consider the differences in the statements of revenue per car-foot mile received by the railroads from the mail service and from other passenger train services, as computed by the department and the committee on railway mail pay.

The earnings per car-foot mile from the mail service and other passenger services as stated by the committee on railway mail pay were 3.23 mills for the mail service and 4.25 mills from other passenger services. These figures were computed from the data as reported by the companies represented by the railway mail pay committee and covered 178,716 miles of service.

The earnings per car-foot mile, as stated by the Post Office Department in its memorandum dated January 17, 1913, in reply to the statement of the railroads entitled "Mail carrying railroads underpaid," were 4.14 mills for mail service and 4.16 mills

for other passenger services. These figures were computed from the data as to space reported to the department by companies representing approximately 175,922 miles of service as reclassified by the department.

The differences between the car-foot-mile earnings by the two calculations are due entirely to the fact that the Post Office Department upon receipt of the data as to space from the railroads made certain modifications therein, based upon the space deemed by the Post Office Department to be necessary for its purposes and upon its rules with respect to assigning other space reported by the companies as mail space, which resulted in a reassignment of the car-foot-mile space to the different subdivisions of passenger train service.

A computation made by the Post Office Department from the data reported by the railroads, representing 187,760 miles of service, as actually operated in November, 1909, without any of the changes and modifications which the department deemed necessary and proper to make in preparing Document 105, brings the following results:

	Miles.
Earnings per car-foot mile in mail service.....	3.37
In other passenger services.....	4.34

The matter of an inquiry into the cost of construction, operation, and maintenance of railway postal cars, which you also referred to the committee, is being investigated, and upon receipt of certain information asked for from the companies a further report will be made relative thereto.

Yours, very truly,

JOSEPH STEWART,
C. H. McBRIDE,
A. N. PRENTISS,

Committee Representing the Post Office Department.

H. E. MACK,
V. J. BRADLEY,
H. P. THRALL,

Committee Representing the Railroads.

But the Post Office Department did not wish to indicate by this letter the acceptance of the railroad point of view regarding dead space, as will be made plain from the following testimony of Hon. Joseph Stewart, Second Assistant Postmaster General:

The full letter is set forth on page 324 of the hearings. There is nothing in the language used which will justify the conclusions that the Post Office Department's representatives conceded that the space so reported by the railroad companies and unchecked by the Post Office Department as deemed "to be necessary for its purposes and upon its rules with respect to assigning other space reported by the companies as mail space" was the proper space to be used as representing the mail service. The purpose of the letter was merely to state to the chairman the reasons for the difference in the results obtained by the railroads' committee and the Post Office Department. This must be well known to the representatives of the railroads who signed the letter, for the representatives of the department declined to sign any reply until it was so worded as in their opinion would make it perfectly clear that no concession as to the correctness of the railroads' claims of erroneous assignment of space was made in the letter by the department. It is therefore difficult to understand why this statement is made in the brief of the railroads' committee. (Hearings, p. 1014.)

Responding to a request for his views on this subject, Mr. Lorenz said:

I can not see how there can be two opinions. It seems to me just as you can not operate a freight service without hauling empty freight cars, and just as you can not operate passenger service without hauling empty space, you can not operate mail service without hauling empty space, and in comparing the various departments, either on cost or revenue basis, you should include all of the space used and unused which is hauled in connection with that service, and I can not understand, therefore, why on this particular point the Post Office Department should have rejected the dead space from the mails and put it in the passenger service. It seems to me that there they made a clear error. (Hearings, p. 514.)

The question of car space as represented by the so-called "dead" space continued to be a bone of contention between the railroads and Post Office Department to the end of the hearings.

BUCKLAND PLAN.

The author of this plan was Mr. E. G. Buckland, vice president of the New York, New Haven & Hartford Railroad Co. He appeared before the committee on February 17, 1913, and submitted a bill. (Hearings, p. 268.) His bill in substance provides that the rates to be paid for the carriage of mail should be on a basis of agreement between the Post Office Department and the railroads, and in case of disagreement the matter should be referred to the Interstate Commerce Commission. Attention is called to this plan particularly for the reason that it provides for making the performance of mail service obligatory upon the railroads. He is the only railroad representative appearing at the hearings who favored a provision of law compelling the railroads to carry the mail. His bill is set out in full on page 939 of the hearings.

BRIEFS.

It was the hope and expectation of the committee, as announced by the chairman on May 14, 1913 (Hearings, p. 711), that the hearings would close on that date. Contemporaneous requests were made at that time by Hon. Joseph Stewart, Second Assistant Postmaster General, and Mr. Ralph Peters, president of the railroads' committee on railway mail pay, for permission to file briefs for the interests they respectively represented. The request was granted and the hope expressed by the chairman that both briefs would be filed by the 1st of June.

The printing of the hearings of May 14 was delayed, awaiting the anticipated filing of the briefs referred to and the filing of other information requested of the Post Office Department.

BRIEF SUBMITTED BY RAILROADS.

[Hearings, pp. 720-738. June 26, 1913.]

On June 26, 1913, the railroads submitted their brief in type-written form, the main points of which, briefly stated, were as follows:

1. In so far as House Document No. 105 (62d Cong., 1st sess.) may have seemed to support the allegation that the mail-carrying railways are overpaid in the annual sum of \$9,000,000, or any other sum, that conclusion has now been officially abandoned by the Post Office Department and it has been made plain that, properly understood, that document demonstrates that these railways are actually underpaid.
2. The existing law has never worked to the disadvantage of the Government, but has failed to do justice to the railways by reason of infrequent weighing; absence of pay for nearly 40 per cent of the space occupied as traveling post offices; the performance without pay of side and terminal messenger service; and the unjustifiable reduction in pay by the act of Congress dated March 2, 1907, supplemented by order No. 412 of the Postmaster General, changing the divisor.
3. Mails should be weighed annually.
4. Railways should be paid for apartment cars.
5. Railways should be relieved from the performance of side and terminal services or fairly paid therefor.
6. The weight basis is simple and, with the modifications above suggested, will be fair both to the Government and to the railways.
7. In effect a cost-space basis is impracticable and inequitable.
8. Railroads should not perform the mail service for the Government for less compensation than for a similar service performed for persons other than the Government.
9. Proof is conclusive that the railroads are underpaid not less than \$15,000,000.

RAILWAY MAIL PAY.

The department's brief not having been received on July 9, 1913, addressed the following letter to

At the last hearing of the joint committee you expressed to the Post Office Department a brief or summary from the department's testimony before the joint committee on the subject of railway mail companies, who at the same time expressed a similar desire. Mr. Peters, chairman of the committee on railway mail pay, filed volume 5 is now being delayed awaiting the submission of two statements referred to in separate letters addressed to the early submission of the brief is not practicable, I shall have the printer without its being included, although I would be glad to print necessities of the case required the printing of the brief to be in a pamphlet by itself.

Under date of July 12, 1913, Gen. Stewart replied

I have to inform you that the matter is being given attention that I am obliged to be absent from the city during the greater part of the month, it will not be practicable for me to submit the brief. I would suggest, therefore, if you deem it necessary that volume be promptly published, that the department's brief be published

The brief referred to was not filed with the joint committee on January 21, 1914.

On March 11, 1913, the Post Office Department submitted a statement respecting differences between the department by the railroad companies in mail service and services rendered to the express

On March 21, 1913, a bill relative to electric cars was introduced by Mr. Henry C. Lyons, secretary of the Boston Electric Railway Association, and submitted by him to the joint committee on bills and resolutions. The bill was reported by the committee on bills and resolutions of the Department by the chairman of the joint committee that it prepare, at the earliest opportunity, such recommendations as it might have to make in regard thereto to the joint committee.

Neither of the two last-mentioned statements was received on July 25, 1913. These statements appear in the House and Senate Reports, respectively.

There being no immediate prospects of the department's brief being filed, the subject matter of the hearings of May 1913 on the railroads' brief was, on August 22, 1913, sent to the printer, and same was received on August 25, 1913, and the completed volume promptly made to Members of Congress by the committee, officials of the Post Office Department.

In addition to the letter of the chairman of July 1913 referred to, and telephonic inquiries made in the interim, the department addressed the following letter to Hon. Joseph S. Chamberlain on September 11, 1913:

Referring to the hearings of February 12, 1913, volume 1, page 1, I would like to inquire when the joint committee may expect the department's brief on railway post-office cars.

I would also like to inquire when the joint committee may expect the department's brief in review of the testimony taken before us which, on previous occasions, you asked permission to file on behalf of the Post Office Department. As indicated in my letter of July 9, 1913, I was greatly disappointed that the brief was not ready for submission so that it might have been printed with the brief submitted by the railroads, appearing in volume 5.

Necessity for an early submission of the report and brief above mentioned and I wish you would therefore advise me promptly upon receipt of the same.

Under date of December 13, 1913, Gen. Stewart replied as follows:

I have your favor inquiring regarding the report as to cars and the brief on behalf of the department.

I am now, and have been for some time past, engaged upon annual reports, committee hearings, and the preparation of the brief in the Court of Claims in the divisor case, which is to be reheard. However, the hearings have closed and annual reports are substantially finished. On account of the great urgency of the matter and agreements between the Department of Justice and the attorneys for the railroads, I am compelled to give precedence at present to the divisor case. I hope in a few days to have this off my hands, and after that the railroad matters have the right of way. I am expecting to get the report on cars to you in a few days and the brief for the department as soon thereafter as it is possible to put it into shape.

The department's brief was finally received in typewritten form on January 21, 1914, immediately printed, and on January 24, 1914, distributed to Members of Congress.

REPORTS OF M. O. LORENZ AND R. H. TURNER.

[Hearings, pp. 840-968.]

Between the hearing of May 14, 1913, and the filing of the department's brief, Mr. M. O. Lorenz,¹ associate statistician of the Interstate Commerce Commission, and Mr. R. H. Turner, secretary of the joint congressional committee, at the request of the chairman, reviewed the testimony and filed written reports. The report of the former is of a statistical nature and contains recommendations for change in the basis of pay, while that of the latter is a résumé of the testimony taken before the joint committee. Their respective reports may be found in the Hearings, pages 849 to 897 and 899 to 968.

MR. LORENZ'S REPORT.

[Hearings, pp. 849-907.]

Mr. Lorenz submitted what he denominated a "weight-space and distance" basis bill. He recommended a combination initial and terminal charge for each one-way trip of a 60-foot car or equivalent thereof varying from \$3 for weight under 1 ton to \$5.50 for 10 to 11 tons. In addition, he recommended a distance charge for each mile run per 60-foot car or equivalent thereof varying from 20.20 cents up to a maximum of 23.54 cents. In both the initial and terminal and the distance rates he provided for a higher charge for additional weight carried. He recommended quadrennial weighings to serve as a check on the space furnished as well as to ascertain the average load per car on which to determine the proper rate to be applied. The combination of terminal and distance charges recognizes the principles that rates per mile should vary with the length of the haul. His rate table was so constructed that a higher average rate per car mile would be paid to the shorter line railroads than to the longer mileage railroads.

His conclusion regarding the average rate to be allowed was as follows:

Taking into account the maximum deduction of 10 per cent from the average passenger-train car-mile earnings of 25.4 cents referred to above, the writer has concluded that 22½ cents would probably not constitute an overpayment on the commercial principle, side and terminal services not being included. This would be an increase of certainly more than 10 per cent, but the per cent of increase can not be stated definitely until further compilations are made by the Post Office Department.

¹ At the request of the joint committee, Mr. Lorenz was given leave of absence without pay from the Interstate Commerce Commission from July 28 to Sept. 30, 1913, for the purpose of assisting the committee in an analysis of the testimony.

Here the doctrine of "public utility" was announced as an important factor, the report of Prof. Henry C. Adams to the Wolcott-Loud Commission, 1901, being the main reliance and authority for its presentation. Because of the—

1. Certainty, constancy and homogeneity of traffic;
2. The certainty and regularity of payment;
3. Railroads are not built primarily to carry mails;
4. The protection to their mail trains which railroads, as Government agencies, receive against unlawful acts in interference with or obstruction of the mails carried; and
5. The principle of public utility—

it was suggested that a reasonable rate to the railroads might be one materially below a commercial rate.

This brief took exception to the claims of the railroads with reference to dead space; stated that Mr. Turner's summary of the evidence in that respect and his deductions therefrom were erroneous in that—

he did not have in mind the instructions which governed the tabulation in accordance with which the railroad companies received credit for extra space in railway post-office cars where such operation was made necessary by the mail service, and could not have been aware of the fact that the larger part of dead space represented railroad operations for the convenience of the railroad companies and only indirectly incidental to the mail service. (Hearings, p. 1015.)

It defended the department's method of apportioning unassignable expenses between freight and passenger services; it took exception to the railroads' claim that they should have annual weighings of the mail in order that they might be more adequately compensated for the service performed; also to their claim that they should be relieved of or compensated for the performance of side and terminal service, and receive pay for their apartment-car service in addition to the weight carried. The position of the department was not so much that the railroads should not receive pay for those respective services, but rather that they were receiving an aggregate compensation for the rendition of mail service sufficient to cover the expense of same and therefore such services should not be specifically paid for.

The brief defends the so-called divisor order No. 412 and takes exception to the railroads' claim as to its illegality as expressed frequently in the hearings, and in their brief of June 26, 1913 (p. 726); also to what was said by Mr. Turner in his report, particularly on page 958 thereof, sustaining the view of the railroads that the order was made without authority of law.

This order, briefly described, was one requiring that the whole number of days included in the weighing period shall be used as a divisor for obtaining the average weights per day, instead of successive working days, excluding Sundays as heretofore. The railroads regarded this order as having been made without authority of law, and against the express desire of Congress, as indicated by its nonaction when the matter was before it. The railroads' attitude with reference to this order is stated by Mr. Newcomb, statistician for the railroads' committee in railway mail pay (p. 99 of the Hearings) which is as follows:

It is well known that the reduction imposed by the act of March 2, 1907, was adopted as a substitute for the reduction which would have resulted had Congress, by its statutory enactment, required the whole number of days of the weighing period (including Sundays), instead of the number of week days or "working days" in that

and identification, be numbered from 1 to 43, only those sections containing what are regarded as salient features being commented upon.

Section 1 (p. 1057) authorizes a readjustment of compensation.

Section 2 (p. 1057) authorizes a restatement of railway mail routes in such manner as the Postmaster General may deem proper.

Sections 3, 4, 5, and 6 (p. 1057) provide for a departure from the present weight basis and the substitution of a space basis, the units upon which compensation is to be determined being the full R. P. O. car, the apartment car, and storage car, closed-pouch service, and side, terminal, and transfer mail service. Four standard sizes of full railway post-office cars, five standard sizes of apartment cars, and four of storage cars are provided for, and not more than 40 feet of storage space may be authorized in baggage cars on trains upon which full railway post-office cars or apartment cars are not operated.

Sections 7 and 28 (pp. 1057 and 1060-1061) require the railroads to carry all employees of the Post Office Department free when directed by the Postmaster General so to do. This is now being done by regulation, the law only requiring free transportation for employees in charge of the mails.

Sections 10, 11, 12, 13, 14, 15, and 16 (pp. 1057 and 1058) prescribe maximum rates for the various classes of service, namely: Railway post-office, apartment and storage cars, and for the respective services in addition, and initial and terminal rate, which are also maximum and not fixed rates. Lower maximum rates are also provided where wooden rather than steel cars are furnished.

Section 17 (p. 1058) provides that closed-pouch mail service shall be paid for on a basis of weight.

Section 18 (p. 1058-1059) relieves the railroads from side and terminal service; and gives the Postmaster General, in his discretion, the power to employ mail messengers under existing law or after advertisement to contract with either the railroads or with third and fourth class postmasters for such service.

Section 19 (p. 1059) provides that land-grant-aided railroads shall receive only 80 per cent of the rates that nonland-grant railroads receive, which is simply a restatement of the present law. Such railroads, however, are relieved of side, terminal, and transfer mail service.

Section 20 (p. 1059) defines initial and terminal rates. For that part of the rate covering loading and unloading the amount to be paid shall not exceed 12 cents a ton, and for the remainder of the rate covering lighting, switching, etc., there shall be a variation in the amount to be paid based on cost of construction and maintenance of R. P. O. apartment and storage cars.

Section 21 (p. 1059) authorizes an annual weighing of closed pouch mail and requires that the whole number of days included in the weighing period shall be used as a divisor.

Sections 22 and 23 (p. 1059) provide that the maximum space in either direction shall be regarded as the space necessary in both directions. These sections are applicable to railway post-office, apartment, and storage cars, the last named, however, being subject to the qualification that no compensation is to be paid where the railroad company makes use of the car on the return movement.

Section 24 (pp. 1059-1060).
authorized at maximum rates,
continued with pro rata reduction

Section 25 (p. 1060) gives the
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Section 26 (p. 1060) provides
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Section 27 (p. 1060) requires
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Section 29 (p. 1061) empowers
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Section 30 (p. 1061) empowers
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Section 31 (p. 1061) authorize
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Section 32 (p. 1061) makes p
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Section 34 (p. 1061) requires r
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Section 35 (p. 1061) authorize
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Section 36 (p. 1061) requires th
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Section 37 (p. 1062) confers p
Commission to make rates on f
and authorizes the Postmaster Ge
of such mail at rates so fixed.

Section 38 (p. 1062) authorizes Postmaster General to distinguish between and arrange for less frequent dispatches of mail matter of the third and fourth classes wherever he can effect economies.

Section 39 (p. 1062) authorizes the Postmaster General to return to the mails, for the utilization of car space paid for and not needed for the mails, postal equipment and supplies theretofore withdrawn from the mails and transported by freight or express.

Section 40 (p. 1062) authorizes Postmaster General to return to the mails in cases of emergency post-office supplies mentioned in the preceding section, but requires him to pay regular rates where additional space is required.

Section 41 (p. 1062) authorizes Postmaster General to take weights of mail for statistical purposes.

Section 42 (p. 1062) compels the railroads to perform mail service not on a basis of contract but upon the mandatory direction of Congress.

The provisions of the department's third suggested plan are set forth in full on pages 73-77 of this report.

HEARINGS REOPENED.

In view of the railroads' continued objections to the inauguration of any space plan and their insistence upon the present weight basis, with the modifications heretofore referred to; the different views expressed on the question of underpay or overpay; and finally the Post Office Department's abandonment of the plan recommended in Document No. 105, as well as its subsequently modified plan, and the substitution of a new plan (Hearings, p. 1057), the hearings were reopened, and on February 26, 1914, the railroads replied to the statement of the department.

RAILROADS' REPLY BRIEF.

[Hearings, February 26, 1914, p. 1063.]

The railroads reaffirmed the position taken by them in their first brief (Hearings, p. 721); called attention to the incompleteness and inaccuracy of Document No. 105, assailing the integrity of the document itself in that it did not publish the items of revenue received by the railroad companies from passenger or express business so that Congress could make a comparison between these and the revenue from mail transportation; that there was no publication of the expenses at railroad stations or of terminal service, or of personal transportation of officers and employees of the Post Office Department, although this information was furnished to the Postmaster General; that there was no statement of the full extent of the car space as originally reported by the railroad companies as being devoted to passenger, mail, and express services. While stating that they did not report any "dead space" whatever, they insisted that if they were expected to report "dead space" in the mail service they should also have been called upon to report "dead space" in the passenger and express services, in which the proportion is greater. They reiterated that they were underpaid approximately \$15,000,000, which underpayment was not shown by Document 105 mainly for two reasons:

(1) That the Post Office Department applied incorrect ratios in the division of railroad operating expenses, and

companies for the service; and the excess of the mail rate over 50 per cent of the express rate, or the reverse where it exists. (Hearings, pp. 1272-41.)

(2) A similar comparison between the same points on a 40-pound package. (Hearings, pp. 1275-1277.)

The Post Office Department's interpretation of these tables is as follows (Hearings, p. 1277):

In most cases the revenue received by the railroad companies for the carriage of 100 pounds and 40 pounds of mail matter between the points named is in excess of the revenue received from the express companies for the carriage of express packages of 100 pounds and 40 pounds, respectively, between the same points. The differences in the rates varied considerably, but in a majority of cases the excess of the mail rate over the compensation for the express is material.

The mail rates mentioned in the tables referred to are for transportation alone and do not include revenue received by the railroad companies for railway post-office cars operated over the routes.

The department figured that if railroad revenues from mail were computed on their estimated ton-mile revenue from express and translated into pay based on space, the Government would have to pay \$46,494,978.58, on a basis of earnings prior to February 1, 1914, but that this figure would be perhaps 16 per cent less under the new express rates; that is, it would be changed to \$39,055,782.01.

In a footnote, page 1279, the Post Office Department gave the revenue from express per car-foot mile as 3.56278 plus mills, or 21.37668 cents per 60-foot car mile as against its figures (Hearings, p. 1008) of 3.865 mills per car-foot mile or 23.19 cents per 60-foot car mile.

The Post Office Department stated, in a letter dated May 28, 1914, that the express revenue per 60-foot car mile was 22.647 cents as of the year ending June 30, 1910, and 23.088 cents as of November, 1909. It was stated, however, that the department had no means of checking the revenues for November, 1909.

FINAL HEARINGS.

[Apr. 1, 2, and 3, 1914, pp. 1319-1554.]

Hearings before the committee were closed on the dates above mentioned. The railroads, through Mr. Ralph Peters, chairman of the railroads' committee on railway mail pay, submitted their final brief. The salient features discussed in these three days' hearings were:

- (1) The application made by the department of its express figures;
- (2) Authorizations of car service by the Post Office Department;
- (3) Dead space; and
- (4) Overpay or underpay.

(1) EXPRESS.

The railroads deny that they are receiving more from mail than express if a comparison is made on a proper basis. In a discussion of relative earnings from mail and express, Mr. James Peabody, of the Atchison, Topeka & Santa Fe, makes the following statement:

I think Mr. Stewart's assumption is that the railroads are satisfied with their receipts from the express companies. I think he has overlooked the fact that the rates which he has quoted are rates compelled by law. So far as that is concerned, under the decision the railroads were not allowed to intervene and present their case, and further,

I doubt if there is a railroad company that to-day on the basis of the present contract, we will not renew our contracts, p. 1315.)

With reference to the Post chairman addressed the following (p. 1316):

The CHAIRMAN. From the present charges, what conclusions have you to the question we have under consideration?

Mr. STEWART. I think they have proved without any question whatever that the rates of the Post Office department are not too low. I have no doubt that the rates of the Post Office are not too high in view of the facts as to the railroad companies.

The railroads in controversy are based on the application of its rates based on the first 15 examples quoted on page 1272, and show on successive pages that the rates for each package of 100 pounds would be if it were based upon 100 1-pound packages the same.

Based on 100 1-pound packages the railroads would receive a higher revenue on their mail traffic, ranging from 311 per cent to 3,400 per cent on 1-pound packages the earning would be from 311 per cent to 3,400 per cent.

According to the railroads' argument made its comparison on minimum earnings of the department as a test for the test would be between the two.

On page 1354 of the Hearings system, says:

The revenue which we get for carrying mail is based on 100 pounds, but based upon 100 pounds.

The railroads, however, could not be intended to throw doubt on the fact of asserting that its new express rates are based on 100 pounds in the hearings that it was not possible (p. 1335).

(2) AUTHORIZATION

The controversies on this subject are the following inquiry proposed (Hearings, p. 1427):

Now, let us see if we understand the difference between the rates that starts at St. Louis and goes to the Memphis by you, as I understand this law, the rate is by route, but on several routes. It has to do with the going and return, and that is the round trip and at any place on the journey, a package of a 60-foot space, you must pay for the going and incoming. Is that right?

To this Mr. Stewart replied:

Hardly right. That would leave the control of the space for which the department should pay entirely to the railroad. If you are going to combine a through car run over several routes and compel the department to pay for the maximum needed on any route it gives the company the opportunity to run one size car out to fill these several authorizations. That will not be fair to the department. (Hearings, pp. 1427-8.)

The discussion showed that it was very difficult to state in a law a definite principle which would control the length of run for which authorizations of various size cars or apartments were to be made. According to the view of the Post Office Department this should be left entirely to the discretion of the Postmaster General, but the railroad companies were anxious that some restriction should be placed upon arbitrary changes in authorizations which would compel them to haul full cars when only fractions of cars were authorized for a portion of a run of the train.

(3) DEAD SPACE.

The significance of this was clearly indicated by the following question propounded by Mr. Lorenz to Mr. Stewart:

Since the department insists on taking this position, I would like to ask Gen. Stewart if he could operate the Missouri Pacific and furnish the space the department has asked for in various length apartments and not have any of this dead space, so-called, left over, or whether any officer—the most efficient operating officer in the United States—could operate the Missouri Pacific and not have any dead space left over? (Hearings, p. 1499.)

To this question Mr. Stewart replied as follows:

MR. STEWART. That would be pretty difficult to answer offhand. If you apply it to a specific case, like that from Kansas City to Pueblo, such as you were discussing when we came in, I should say yes.

MR. LORENZ. I will admit there are individual cases, but I said where there is none of the dead space.

MR. STEWART. I would not be able to say that it could be done. (Hearings, p. 1499.)

On page 1378 of the hearings Mr. Bradley makes the following statement:

I would like to suggest in regard to the computation of car mileage as of November 30, 1913, I think that it is quite likely that it would be difficult for the department to make a satisfactory estimate, because of the inability to get a correct record of the storage car movement, especially the additional storage car movement, without actually going to the companies or to the Railway Mail Service and having the records kept. There has been a great growth in that class of service, largely due to the growth of the parcel post. If the computation was made from the railway post-office schedule made in the Railway Mail Service that is supposed to report the usual conditions, I do not think that an accurate estimate could be obtained.

To this Mr. Stewart replied:

We differ from Mr. Bradley on that. Furthermore, we would hardly take the chance of making a mistake on these figures without safeguarding ourselves in every way, inasmuch as we are dependent upon them for our judgment as to the effect of these rates proposed in the suggested bill. (Hearings, p. 1378.)

On page 1497 Mr. Stewart says:

For storage space we have taken one-half of the return movement, because we have no statistics as to what proportion of the storage cars are used by the companies on their return trip, and nothing has been presented by the railroad companies which would be any guide.

Mr. STEWART. Yes, Senator; inasmuch as that is the only thing before us, it is the only ascertainment that has been made.

The CHAIRMAN. Document 105 was the result of inquiries for the month of November, 1909, made by the department upon the railroads, and the tables were prepared by the department from the answers to those questions. That is true, is it?

Mr. STEWART. No. I could not say that that is true. If I answered that "yes," it would not be correct, and if I answered it "no," it would not be correct. We have explained a number of times that the railroad companies reported more space than we could accept, and, therefore, it is not based primarily on what they reported to us. It is based upon the reports of the railroad companies as properly revised by the department to represent the space needed and used.

The CHAIRMAN. Then that comes to what I want to get at. Then the correctness of the deductions in reference to overpayment depends upon the correctness of the apportionment of tables prepared by the department upon the information submitted by the railroads in reply to inquiries submitted by the Government to the railroads. Is that correct?

Mr. STEWART. That is substantially correct.

The CHAIRMAN. Then the difference in dead space, the allotment between the department and the railroads is the crucial test as to the correctness of the deductions in reference to the question of overpay or underpay. Is that true?

Mr. STEWART. That, I think, represents the material point of difference between the railroads and the department.

The CHAIRMAN. That is the key to the problem of correctness of the dead-space apportionment, the key to the main factor?

Mr. STEWART. I think so, in so far as Document 105 is concerned.

The CHAIRMAN. So far as the conclusions in reference to the underpay or overpay, if the conclusions are based solely upon the ascertainment and information, that being all available as contained in Document 105.

Mr. STEWART. You are referring, of course, to Document 105 as shown, without reference to anything else that has been submitted to the commission, the consideration of express rates, etc.?

The CHAIRMAN. I am, so far as the overpay or underpay is concerned; that is, so far as your own conclusions are concerned.

Mr. STEWART. And without regard to any consideration of the special items I have submitted here which might be taken into account?

The CHAIRMAN. I am not asserting anything, but I am trying to put interrogatories to follow out your line and see how your thoughts appeal to my mind.

Mr. STEWART. To make my answer complete to your question, which is very comprehensive, I would have to insert at this point in the record all the things I have said which I think the commission should take into consideration, not solely those presented in Document 105, but all the other considerations as to whether the railroads were overpaid or underpaid.

The CHAIRMAN. And you have come to a conclusion, as I understand it, that the railroads have been overpaid, and the testimony will show specific statements to the effect, if my memory serves me rightly. What value do you give to Document 105 ascertainment?

Mr. STEWART. I gave primary value to that. All these other considerations that I have mentioned simply accentuate the conditions shown by Document 105. For instance, when I say that Document 105, taken on its face, shows more revenue received than expenses fairly apportioned to the mail service, that is subject again to the criticism that I myself make against the plan, to the effect that it proceeds upon a most liberal plan of apportionment, which I pointed out this morning.

The CHAIRMAN. I was not discussing the plan at all, but simply the conclusion or conviction in your own mind with reference to overpay or underpay, which is one of the phases of the study, and that your conclusions, which are definite, according to the testimony, are based primarily and, as I understood you, almost entirely upon Document 105 ascertainment.

Mr. STEWART. So far as the specific figures are concerned which we have submitted, that is true.

The chairman pursued the inquiry further by asking the following questions of Mr. Lorenz (Hearings, pp. 1518-1519):

The CHAIRMAN. Dr. Lorenz, you have read all of the evidence that has been submitted at the various hearings and have for a period of over two months devoted your time exclusively to a special study of this subject, and intermittently it has had your consideration for over a year. Now, outside of the information contained

in Document 105 and other vic
other facts or additional informa
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To this Mr. Lorenz repl

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The CHAIRMAN. That is the
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Mr. LORENZ. Yes. Of course
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basis on which he could tabulate the mileage for storage car and closed pouch mail.

The department furnished lists of all the trains utilizing the mail and estimates of the probable authorization of space on each train. These statistics were tabulated and a conclusion was reached by both the department and Mr. Lorenz that indicated approximately 205,000,000 car miles for apartment and railway post-office car service. This was about 11,000,000 car miles less than the figures which the department had previously assumed for corresponding service.

Mr. Lorenz stated that the only way he could compute the probable total car miles was by adding amounts corresponding to the proportions found in Document No. 105 for various classes of space, which indicated on a 60-foot-car basis for storage space 23,800,000 car miles and for closed pouch 6,700,000 car miles, making a total of 235,500,000 car miles. The department at first substantially agreed with the closed-pouch estimate, but thought the storage space should be 14,000,000 car miles greater—that is, approximately 38,000,000 car miles. In view of this difference, and since neither estimate was the result of accurate information, it was decided to test this matter further by getting reports from the field as to the actual storage cars run. At the request of the joint committee, the Postmaster General sent telegrams to all of the division superintendents in the *Railway Mail Service* asking them for lists of the trains and storage cars actually run for each of the two weeks ending March 21 and May 23, respectively. The result of this inquiry indicates approximately 51,000,000 car miles for storage-car service per annum, including the empty return. This assumes that the railroads would in no case make use of the empty cars. This surprising change in storage-car estimates would add about 13,000,000 car miles to the department's original estimate, which underestimate, combined with the overestimate of 11,000,000 car miles above mentioned, added approximately 2,000,000 car miles net to the department's original estimate of 260,000,000. The total then stood at approximately 262,000,000 car miles, but subsequently the department announced a result of a special inquiry regarding closed-pouch service. This indicated 164,817,446 service miles, but the department made no attempt to prorate this figure to a 60-foot-car basis.

PASSENGER, PULLMAN, EXPRESS, AND MAIL REVENUE.

Under date of May 5, 1914, the chairman addressed a letter to the president of the Pullman Co. at Chicago, Ill., the object in view being to ascertain whether that company had any statistics which would show the revenue received by the railroads on account of Pullman business.

The Pullman Co. replied as follows:

CHICAGO, ILL., May 7, 1914.

HON. JONATHAN BOURNE,

Chairman Committee on Transportation of Mail, Washington, D. C.

Regret exceedingly inability to give information requested your letter 5th. as keep no record of passenger miles, our rates being based on space occupied. Two passengers may occupy one berth at same rate or six passengers on one drawing-room ticket. Seat-rate basis, 5 mills per mile; berth-rate, 6 $\frac{1}{2}$ mills per mile for space but not per passenger mile. As explained above, your passengers per car is approximately correct.

JOHN S. RUNNELLS.

On April 30, 1914, the cl
Assistant Postmaster Gener
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calculation eliminated the revenue and car miles of roads less than 100 miles in length. The department also gave a figure of 23.088 cents for November, 1909. With reference to this figure, Mr. Stewart, in his letter of May 28, 1914, says:

Your further request that the express revenue reported to the department by the railroads for the month of November, 1909, be totaled, together with the corresponding car-foot miles and car miles, is noted. In compliance therewith, results have been ascertained as follows:

Total car-foot miles in express service.....	1, 301, 503, 075
Total express revenue.....	\$5, 009, 337
Express revenue per car-foot mile.....mills..	3.848

(Figures do not include data for the Long Island R. R.)

Owing to the fact that the items of express revenue composing the above total revenue have not been examined, checked, nor published in House Document 105, the department is not prepared to vouch for the accuracy of the rate per car-foot mile based thereon, namely, 3.848 mills.

Throughout this inquiry where requests for information were made of the Post Office Department, similar requests were made of the railroads in order that data secured from the one might serve as a check on or verification of that furnished by the other. We have exhausted every possible effort to secure information of a demonstrable nature. On account of the extreme technicality of the subject matter which we have had under consideration we have met with many obstacles in our efforts to reach this desirable end; hence delays have resulted awaiting verification of statements submitted, the correctness of which we were unwilling to accept without such verification. Our aim, as already indicated, has been to present facts to Congress and not estimates.

We take pleasure in expressing our appreciation and recognition of the able and valuable assistance rendered our committee by its secretary, Mr. Robert H. Turner, in our preparation of this chapter of our report.

CHAPTER III.

THE WEIGHT BASIS, ITS DEFECTS—THE SPACE BASIS.

In the foregoing chapter is presented a historical review of previous investigations of the subject of railway mail pay, and a résumé of the testimony and arguments submitted in this inquiry. Some of the statistics will be presented more in detail in succeeding pages, and the merits of different plans suggested will be discussed. Preliminary thereto we submit the following brief summary of laws enacted upon this subject, beginning with the act of 1873, which is the basis of the present system of railway mail compensation:

The act of March 3, 1873, authorized and directed the Postmaster General to readjust railway mail compensation on the basis of a rate per mile per annum according to the average daily weight carried on each route, the weight being determined by a weighing of the mails for not less than 30 successive working days, and at least once in every four years. The rates are stated in the following table:

Average weight of mails per day carried over whole length of route:	Rates allowable under act of Mar. 3, 1873.
200 pounds.....	\$50
500 pounds.....	75
1,000 pounds.....	100
1,500 pounds.....	125
2,000 pounds.....	150
3,500 pounds.....	175
5,000 pounds.....	200
For each additional 2,000 above 5,000 and less than 48,000 pounds.....	25
For each additional 2,000 pounds in excess of 48,000 pounds.....	25

The same act provided that additional pay should be allowed for a daily trip of a full railway post-office car 40 feet or more in length at the following rates per mile per annum:

40-foot car.....	\$25
45-foot car.....	30
50-foot car.....	40
55 to 60 foot car (or more).....	50

The act of July 12, 1876, made a flat reduction of 10 per cent in each of the weight rates. The same act provided that land-grant railroads shall be paid only 80 per cent of the regular rates.

The act of June 17, 1878, made a further reduction of 5 per cent in the weight rates.

The act of March 3, 1905, required that the mails should be weighed for not less than 90 successive working days instead of for 30 days, as required by the law of 1873.

The act of March 2, 1907, made a further reduction of 5 per cent in the weight rates on routes carrying a daily average of over 5,000 pounds and a reduction of 10 per cent in the rates on routes carrying a daily average of over 48,000 pounds.

The same act made reductions in the rates to be paid for R. P. O. car service, the new rates per mile per annum being:

40-foot car.....	\$25. 00
45-foot car.....	27. 50
50-foot car.....	32. 50
55 to 60 foot car or more.....	40. 00

On June 7, 1907, Postmaster General Meyer issued Order No. 412, changing the method of computing the average daily weight of mail carried. Although this was not a change in the law, it is mentioned here because it was a change in the interpretation of law which had the effect of reducing the pay of the railroads about \$5,000,000 per annum. The divisor order is described on pages 44-45 and 117, 118.

The act of May 12, 1910, reduced the rate for land-grant routes on each 2,000 pounds in excess of 48,000 pounds from \$17.10 to \$15.39.

The act of August 24, 1912, authorized the Postmaster General to readjust pay if mail be diverted from one route to another to the extent of not less than 10 per cent of the weight on either route.

PRESENT WEIGHT RATES.

The annual rates now in force are as follows:

Average weight of mails per day carried over whole length of route.	To non-land-grant railroads per mile per annum.	To land-grant railroads per mile per annum.	Intermedi-ate weights for which additional allowance is paid at the rates stated in note 1.
			<i>Pounds.</i>
200 pounds.....	\$42. 75	\$34. 20	
200 to 500 pounds.....			12
500 pounds.....	64. 12	51. 30	
500 to 1,000 pounds.....			20
1,000 pounds.....	85. 50	68. 40	
1,000 to 1,500 pounds.....			20
1,500 pounds.....	106. 87	85. 50	
1,500 to 2,000 pounds.....			20
2,000 pounds.....	128. 25	102. 60	
2,000 to 3,500 pounds.....			60
3,500 pounds.....	149. 62	119. 70	
3,500 to 5,000 pounds.....			60
5,000 pounds.....	171. 00	136. 80	
For each additional 2,000 pounds above 5,000 and less than 48,000 pounds.....	20. 30+	16. 24+	
Above 5,000 and less than 48,000 pounds.....			80
For each additional 2,000 pounds in excess of 48,000 pounds.....	19. 24	15. 39	

NOTE 1.—For each additional number of pounds weight indicated in the third column there is paid to nonland-grant roads 85 cents per mile per annum and to land-grant roads 68+ cents per mile per annum, except that on routes carrying from 5,000 to 48,000 pounds the additional allowance is 81 cents per mile per annum to nonland-grant roads and 64 cents per mile per annum to land-grant roads.

PRESENT RAILWAY POST-OFFICE-CAR RATES.

The rates paid for use and for part of the transportation cost of railway post-office cars per mile per annum are as follows per round trip daily:

Railway post-office cars 40 feet in length, inside measurement.....	\$25. 00
Railway post-office cars 45 feet in length, inside measurement.....	27. 50
Railway post-office cars 50 feet in length, inside measurement.....	32. 50
Railway post-office cars 55 feet in length, inside measurement.....	40. 00

COMPARISON OF AUDIT

The following table show
expenditure, and the exp
railway post-office cars con

Fiscal year.	Audited revenues.	Pe in as p v pr f y
1879.....	\$30,041,982.86	
1880.....	33,315,479.34	
1881.....	36,785,397.97	
1882.....	41,876,410.15	
1883.....	45,508,692.61	
1884.....	43,325,958.81	
1885.....	42,560,843.83	
1886.....	43,948,422.95	
1887.....	48,837,609.39	
1888.....	52,695,176.79	
1889.....	56,175,611.18	
1890.....	60,882,097.92	
1891.....	65,931,785.72	
1892.....	70,930,475.98	
1893.....	75,896,933.16	
1894.....	75,080,479.04	
1895.....	76,983,128.19	
1896.....	82,499,208.40	
1897.....	82,665,462.73	
1898.....	89,012,618.55	
1899.....	95,021,384.17	
1900.....	102,354,579.29	
1901.....	111,631,193.39	
1902.....	121,848,047.26	
1903.....	134,224,443.24	
1904.....	143,582,624.34	
1905.....	152,826,585.10	
1906.....	167,932,782.95	
1907.....	183,585,005.57	
1908.....	191,478,663.41	
1909.....	203,562,383.07	
1910.....	224,128,657.62	
1911.....	237,879,823.60	
1912.....	246,744,015.88	
1913.....	266,619,525.65	

1914 appropriation
1915 appropriation

¹ It will be noted that the figures in this
Commerce Commission reports and pres
that the Post Office Departments' report
state Commerce Commission reports cover
Some railroads make incomplete or defec

² Decrease.

³ Includes \$500,000 for transportation of

⁴ Includes \$510,000 for transportation of

DEFECTS

The problem of fixing co
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compensation for transportation of the mail involves all the difficulties that are encountered in considering the question of transportation of commodities or passengers, and also presents the difficulty incident to the transportation of something that is of incalculable value, and yet having no commercial value in the ordinary sense of the term. It is not surprising, therefore, that during all the years of uncertainty regarding a proper basis for the fixing of rates for freight and passengers the intermittent efforts of Members of Congress and of the Post Office Department to work out a satisfactory plan for compensating railroads for mail transportation have proven futile.

It may safely be asserted that the present method of computing the compensation is so complicated and so difficult to understand that a business man of average ability and business experience could not read the existing laws and then compute the amount that should be paid any road. It is not pretended that the above brief statement is a full and exact explanation of the present system of compensation.

We believe that its intricacy and complexity alone is sufficient to condemn the present system. We assert that whenever practicable all transportation rates, whether for freight, passengers, express, or mail, should be stated in terms so plain that the average citizen may know the unit of service, the rate payable, and be able therefrom to compute the total amount due.

But the present system has other defects which may be thus concisely stated:

Quadrennial weighings are an unsatisfactory basis, because they make no allowance for changes in quantity of mail during the four-year periods.

Should the mail diminish between quadrennial weighing periods, the Government would have to pay for service not performed; and if it increased, the railroads would receive no compensation for transporting the increased volume of mail. This is manifestly unjust and unbusinesslike.

Quadrennial weighings cost the Government an average of about \$400,000 per year and entail a considerable expense upon the railroads in checking Government weights in order to guard against mistakes.

Compensation for four years on the basis of a 90-day weighing period is wrong in principle as it creates opportunity for the railroads to pad the mails or the Post Office Department to deplete them during such a weighing period.

The present system requires the railroads to carry the mails between the depot and the post office in most instances, but relieves them of that burden in many instances. Conveyance of mail on city streets is no proper part of railroad duty. Railroad transportation, both freight and passenger, begins and ends at railroad depots and terminals.

The present system pays the same rate per ton-mile whether the haul is long or short; yet terminal expenses are relatively the same regardless of the length of the haul, thus creating an inequality between the short lines and trunk lines, although the present system attempts to counteract this by paying a different rate for different densities of traffic.

The present system ignores the frequency of service—pays the same rate for mail carried on one train as for the same daily average weight

carried on two or more tr
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Compensation based chief
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SPACE AS A

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consideration of the subject

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used for the distribution c
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pose of facilitating the raj
a car with only 2 to 3 tons
basis that will afford a res
both car and contents.

Heretofore the railroads
classes—first, for the tran
ascertained by weight; and
of railway post-office cars

distribution in transit. This is an express recognition of the right of the railroads to compensation for hauling the working space. We are already on a partial space basis.

It is to the interest of the Government, however, to fix the compensation on such a basis as will encourage the department and its employees to utilize all the space it is practicable for them to use. Naturally, it will be the desire of the department to make as good a record as possible for economical management. If the entire compensation be based upon a standard of space, the supervisory officials in the department will encourage and require their employees to utilize that space as fully and economically as possible. The judicious expenditure of public money will thus be encouraged and economic waste minimized.

ADVANTAGES OF SPACE BASIS.

We favor the adoption of space rather than weight as the basis for measuring the service rendered, for the following reasons:

It permits fluctuation of mail pay with every material fluctuation in the service.

It eliminates the cost and inconvenience of the quadrennial weighing.

It eliminates the temptation for dishonest efforts to either deplete or pad mails during the weighing periods, because it abolishes all weighing.

It minimizes waste by encouraging the Post Office Department to utilize as nearly as possible all the space it pays for in mail cars.

It constitutes a system of compensation so definite, simple, and clear that any citizen can understand it and can know exactly what service each railroad is rendering, its rate of pay, and the amount of annual compensation.

Rapid development of the parcel-post service furnishes another strong reason for the substitution of space for weight as a basis of railway mail compensation. Since expansion of the parcel post, the quadrennial weighing has become much more unsatisfactory as a means of determining the compensation to be paid for transportation.

As already indicated, the idea of adopting space as the basis for railway mail pay is not new. The subject was presented at length before the Hubbard Commission in 1876, before the Elmer-Thompson-Slater Commission in 1883, and before the Wolcott-Loud Commission in 1898. The former two commissions favored the space basis and, from expressions heretofore quoted, it seems probable that the Wolcott-Loud Commission would have reached a similar conclusion if it had pursued the subject more extensively. The Hitchcock plan, in Document 105, was based upon space, but was so defective in other respects that the department itself found it advisable to abandon it.

Although the Post Office Department failed to evolve any practical, administrable space plan and the railroads have almost unanimously opposed the space basis, yet we feel that we have constructed a scientific, simple, and most desirable space plan as presented in our suggested bill, and are confident that the adoption and operation of same will prove highly satisfactory to both the Government and the railroads, certainly far more satisfactory than our present system.

the mails on their respective roads and the proper compensation to be paid for that service. He shall require all such companies to submit such information not later than March first, nineteen hundred and twelve, and in each fiscal year thereafter at such times and for such periods as he shall prescribe. It shall be the duty of such railroad companies to furnish such information, and if any railroad company fails or refuses to do so when required, its compensation for service rendered thereafter until such company shall comply and an adjustment is made by the Postmaster General, shall be forfeited to the United States and shall be withheld as liquidated damages.

If any officer, agent, or employee of a railroad company shall knowingly furnish any information required under the provisions of this act that is false and fraudulent, he shall be fined not more than twenty thousand dollars and imprisoned not more than five years.

The Postmaster General shall determine the cost to each railroad company of carrying the mails on its respective road or roads, and shall verify and state the result in such form and manner as he shall deem proper. For this purpose he is authorized to credit, assign, and apportion the revenues and expenses of railroad companies so reported in such manner as he shall deem fair and equitable and in his judgment necessary to ascertain the cost as near as practicable, a statement of which shall be given the company concerned. If any railroad company shall object to the method of crediting, assigning, and apportioning the revenues and expenses, it may file objection with the Postmaster General within twenty days after such statement is made to the company, and the Postmaster General shall thereupon certify the method and objection, and such papers as in his judgment may be essential to an understanding of the method, to the Interstate Commerce Commission, who shall review the finding of the Postmaster General and affirm, modify, or revise the same, and certify the result to the Postmaster General, which action thereon shall be final.

The Postmaster General is authorized and directed to readjust the pay to companies operating railroads for the transportation and handling of the mails and furnishing facilities in connection therewith, not less frequently than once in each fiscal year, commencing with July first, nineteen hundred and twelve, at a rate of compensation per annum not exceeding the cost to the railroad companies of carrying the mails as ascertained by him, and six per centum of such cost: *Provided*, That when such ascertained cost and six per centum does not equal twenty-five dollars per mile per annum, he may, in his discretion, allow not exceeding such rate.

Railroad companies whose railroads were constructed in whole or in part by a land grant made by Congress on the condition that the mails should be transported over their roads at such price as Congress should by law direct, shall receive not exceeding the cost to them of performing the service.

Information shall be furnished and adjustments made as near as practicable by accounting systems or roads, and the cost and the compensation for the term shall be stated for all service covered by each system or road. The routes for a system or road may be stated for administrative purposes in such manner as the Postmaster General may determine.

The Postmaster General may order new or additional service during a term for which an adjustment shall have been made or service authorized on any system or road, in any train operated by such system or road over any part of the trackage included in the adjustment or authorization, and without additional compensation therefor during such term.

He may order service over new or additional trackage of an adjusted system or road during a term and state the amount performed for the remainder of such term on statistics obtained for the first thirty days of service. Payment therefor may be made at not exceeding the average rate per car-foot mile for the system or road ascertained at the regular adjustment. Entire discontinuance of service over trackage included in the adjustment or thereafter added shall be deducted for at the car-foot mile rate of adjustment or mile rate of authorization. In case the operation of service over trackage included in an adjustment or thereafter added is undertaken by another company during the term, the same may be recognized by the Postmaster General, provided the companies in interest shall file with him their joint agreement as to the part of the compensation of the old operating company to be paid the new operating company; otherwise payment to the company first authorized shall be full payment for all service performed for the term.

The Postmaster General may order service over trackage of a railroad company not operating service under an adjustment or authorization after the regular adjustment for the remainder of the term, and pay therefor at not exceeding forty-two dollars and seventy-five cents per mile of trackage per annum.

Service over property owned or controlled by a terminal company shall be considered service of the roads or systems using such property and not that of the terminal company.

Railroad companies carrying them for and handling them when used in the transport of mail or parts of cars used in the transport of mail in stations before the departure of the train shall provide side, terminal, and direct rooms for handling, distribution, and rooms for the employees of the train when ordered by the Postmaster General.

Every railroad company carrying mail shall be allowed to travel without extra charge therefor duty and traveling to and from the Post Office Department and the Post Office upon the exhibition of their credentials.

All cars or parts of cars used for the transport of mail shall be constructed, style, length, and character required by the Postmaster General. They shall be heated, lighted, and cleaned by a person employed by the Post Office. Payment shall be made for service in material and construction, and for water containers and toilet facilities cleaned. No pay for service shall be made for a post-office car unless constructed in accordance with the plans and specifications of the Post Office. No wooden railway post-office car shall be used as an underframe car, or between the end of a train. All additional cars accepted for the transport of mail if used in a train in which a majority of the cars are of steel or of iron shall be accepted on or before the first of July, nineteen hundred and five. No car shall be used or paid for unless it shall prove or allow to be used or paid for. No car constructed of steel or with steel underframe shall be used unless a majority of the cars are of steel or of iron. The Postmaster General shall make deductions from the value of the service computed on the basis of the cars do not comply with the provisions of this section.

The space in cars devoted to the transport of mail shall be fixed by the Postmaster General for the use of the Post Office companies, shall be taken as the basis for the computation of mail service for the purpose of the following: *Provided*, That no credit shall be given for the distribution of the mails unless the Postmaster General or unless he shall determine otherwise by his authorization.

If any railroad company shall fail to provide the space for distribution purposes when required or refuse to construct, fit up, maintain, or repair such appliances for use in case of emergency, the Postmaster General, it shall be fined such sum as may be deemed proper.

The Postmaster General shall insure the mails shall be conveyed. If any railroad company shall fail to carry on any train it operates all the mails, the Postmaster General shall consider just to the Post Office Department such amount as may, in the opinion of the Postmaster General, be deemed proper.

The Postmaster General may make such regulations as he may deem proper for carrying the mails under the provisions of this section where, in his judgment, the service required is not provided. He may require it and impose fine on any railroad company the price of the value of the service required exceeding three times its value if the railroad company fails to comply.

The Postmaster General is authorized to make such arrangements of space taken and to collect the same from the Post Office Department as he may deem proper and verified to him by such person as he may consider just to the Post Office Department the ascertainment of the space used.

mails on railroads, and to employ such special clerical and other assistance as shall be necessary to carry out the provisions of this act, and to rent quarters in Washington, District of Columbia, if necessary, for the clerical force engaged thereon, and to pay for the same out of the appropriation for inland transportation by railroads.

The provisions of this act shall apply to service operated by railroad companies partly by railroad and partly by steamboats.

The provisions of this act respecting the rate of compensation and the determination thereof shall not apply to mails conveyed under special arrangement in freight trains, for which a rate not exceeding the usual and just freight rates may be paid in accordance with the classifications and tariffs approved by the Interstate Commerce Commission.

It shall be unlawful for any railroad company to refuse to carry the mails at the rates of compensation provided by law when and for the period required by the Postmaster General so to do, and for every such offense it shall be fined not exceeding \$5,000.

All laws or parts of laws inconsistent herewith are hereby repealed.

CAPITAL CHARGES DISREGARDED.

Mr. Hitchcock strongly recommended to Congress the enactment of this bill, conveying to Congress by letter the impression that the result of such legislation would be a saving to the Government of about \$9,000,000 in railway mail pay. This statement attracted a great deal of attention, and tended to confirm the widespread popular impression that the mail payments to steam railroads by the Government were and are excessive. Evidently Mr. Hitchcock and his departmental committee studying this problem, failed to realize that rights of way, roadbeds, tracks, equipment, and terminals were necessary prerequisites in the operation of mail cars, as no allowance whatever was made in the suggested method of payment for capital charges, but the sole compensation to the railroads should be the Postmaster General's ascertained cost to the railroad companies for carrying the mail and 6 per cent of said cost.

The bill was referred to the Senate Committee on Post Offices and Post Roads. The Post Office Department urged its inclusion in the Post Office appropriation bill, then under consideration by the Senate committee. The Senate committee thought best, because of the technicality and importance of the subject and the shortness of time remaining before the adjournment of Congress, to leave the matter for later consideration, and recommended the appointment of a joint committee for a special study of the subject of compensation for the transportation of mail as well as postage on second-class mail matter. Congress acted in accordance with the suggestion of that committee, with the result that our committee was created.

DISCUSSION OF PLAN INVITED.

For the purpose of getting the department's views before the country and enabling Congress to get all possible information bearing on the subject matter, the Senate Committee on Post Offices and Post Roads requested its then chairman, Jonathan Bourne, jr., to introduce the departmental suggested draft of a bill in the Senate, and Chairman Bourne sent a copy of same to each one of the railroads with a letter requesting their comments, criticisms, and suggestions relative to the tentative departmental plan.

The railroad representatives vigorously assailed the soundness and justice of the conclusions announced by the department in Document

No. 105 and as embodied in the department. They held that the allowance should not be operating expenses, but upon the mail service's charges. They further claimed that the department's statistical errors in its method of tabulating space occupied on passenger trains by mail and express services, respectively. The railroad space to be charged to mail all the space actually occupied with that service, irrespective of whether it was

In the mail service, as in other branches of traffic is not evenly balanced in both directions. One direction must be brought back empty. In tabulating the space returns, segregated a large space. This was of various classes, but all classes put together in one column, and in some tables of passenger space. In making its deductions from tabulation, the department did not consider the mail space as mail space except to a slight extent called it "deadhead" space. This error was not by the department, and much time was consumed in the discussion of this question of "dead space."

The admission of this error would absolutely vitiate the basis upon which the department could claim that the basis the railroads were overpaid.

ERRONEOUS TREATMENT OF MAIL SPACE

To our minds, the discussion of this subject, which is interjected here, may pursue extensively in the printed conclusions that here also the department made. Some of the so-called dead space may have been legible as when a particular train running six times a week put down as running seven times a week. But empty space unavoidably run in connection with mail is not to be considered as chargeable to the department. Empty seats in the passenger car are all charged to the mail service, must appeal to any fair-minded person as utterly unwarranted. To be sure, one must be paid for loaded cars only, but then the rates must be enough to include a payment for the average empty movement. We may illustrate the effect of dead space in making comparison of earnings in the other passenger-train service as follows: It is understood that "dead space" is all charged to the mail service. It paid 20.22 cents per car mile in November, 1909, while the passenger service counted it paid 24.84 cents per car mile. If in the passenger-train services all the space is counted, which is the case, then the mail service must be counted from the evidence submitted, it has been shown that the representatives of both the department and the railroads received a car-mile rate of 26.04 cents. It is indisputable that the 26.04 cents passenger-car-mile rate must be compared with the 20.22 cents for mail and not with the 24.84 cents for mail given above.

The department's claims as to the overpay of railroads for mail transportation are all predicated on the soundness of its allotment of "dead" and "deadhead" space, as set forth in said Document No. 105. We have demonstrated the unfairness of such allotment and find that the department has totally failed to justify its claims that the railroads are overpaid for mail transportation.

While not specifically admitted, we think the Second Assistant Postmaster General, representing the department, virtually admitted the error when he stated in the hearings, page 1499, he could not say that it was possible to operate the railroads without having some of this dead space connected with mail service. Furthermore, the latest bill approved by the department (H. R. 17042) provides for authorization of space by 60, 30, and 15 foot units, which involves an authorization of much of the so-called dead space. Thus the department has tacitly admitted its error, although its representatives were not willing to do so in express terms at the hearings.

DEPARTMENT SUBMITS A SECOND PLAN.

The demonstration and realization of the injustice and unadministrableness of the department's suggested bill of August 12, 1911, doubtless caused the then Postmaster General, Mr. Hitchcock, on January 20, 1913, to submit a second draft of a bill for regulation of railway mail pay, which reads as follows:

TENTATIVE DRAFT OF PROPOSED LAW FOR REGULATION OF RAILWAY MAIL PAY.

The Postmaster General is authorized and directed to require companies operating railroads by steam, electricity, or other motive power, carrying the mails to furnish, under oath and seal, not less frequently than once in each fiscal year, such information relating to the service, operation, receipts, and expenditures, and such other information of such roads for a period of not less than thirty days, to be designated by him, as may in his judgment be deemed necessary to enable him to ascertain the cost to the companies of carrying the mails on their respective roads and the proper compensation to be paid for that service. He shall require all such companies to submit such information not later than March first, nineteen hundred and fourteen, and in each fiscal year thereafter, at such times and for such periods as he shall prescribe. It shall be the duty of such railroad companies to furnish such information, and if any railroad company fails or refuses to do so when required its compensation for service rendered thereafter until such company shall comply and an adjustment is made by the Postmaster General shall be forfeited to the United States and shall be withheld as liquidated damages.

If any officer, agent, or employee of a railroad company shall knowingly furnish any information required under the provisions of this act that is false and fraudulent he shall be fined not more than twenty thousand dollars and imprisoned not more than five years.

The Postmaster General shall determine the cost to each railroad company of carrying the mails on its respective road or roads, and shall verify and state the result in such form and manner as he shall deem proper. For this purpose he shall transmit the information furnished by the railroad companies relating to the operating expenditures to the Interstate Commerce Commission, who shall credit, assign, and apportion such operating expenditures to the passenger and freight services, and report the result as to the passenger service to the Postmaster General. The Postmaster General is authorized to credit, assign, and apportion the passenger operating expenses as reported to him by the Interstate Commerce Commission, and the taxes in such manner as will determine the proportion thereof chargeable to the mail service, a statement of which shall be given the company concerned. If any railroad company shall object to the method of crediting, assigning, and apportioning the passenger operating expenses and taxes to the mail service, it may file objection with the Postmaster General within twenty days after such statement is made to the company, and the Postmaster General shall thereupon certify the method and objection and such papers as in his judgment may be essential to an understanding of the method, to the Interstate Commerce

Commission, who shall review the finding of the Postmaster General and affirm, modify, or revise the same, and certify the result to the Postmaster General, which action thereon shall be final.

The Postmaster General is authorized and directed to readjust the pay to companies operating railroads for the transportation and handling of the mails and furnishing facilities in connection therewith, not less frequently than once in each fiscal year, commencing with July first, nineteen hundred and fourteen, at a rate of compensation per annum equal to the cost to the railroad companies of carrying the mails as ascertained by him, and six per centum of such cost; in addition, companies may be allowed such additional amounts, if any be necessary, as shall render the whole a proper proportion of a fair and reasonable return on the value of the property necessarily employed in connection with the mail service: *Provided*, That when such sum does not equal \$25 per mile per annum, he may, in his discretion, allow not exceeding such rate.

Railroad companies whose railroads were constructed in whole or in part by a land grant made by Congress, on the condition that the mails should be transported over their roads at such price as Congress should by law direct, shall receive not exceeding the cost to them of performing the service.

Information shall be furnished and adjustments made as nearly as practicable by accounting systems or roads, and the cost and the compensation for the term shall be stated for all service covered by each system or road. The routes for a system or road may be stated for administrative purposes in such manner as the Postmaster General may determine.

The Postmaster General may order new or additional service during a term for which an adjustment shall have been made or service authorized on any system or road in any train operated by such system or road over any part of the trackage included in the adjustment or authorization, and without additional compensation therefor during such term.

He may order service over new or additional trackage of an adjusted system or road during a term and state the amount performed for the remainder of such term on statistics obtained for the first thirty days of service. Payment therefor may be made at not exceeding the average rate per car-foot mile for the system or road ascertained at the regular adjustment. Entire discontinuance of service over trackage included in the adjustment or thereafter added shall be deducted for at the car-foot mile rate of adjustment or mile rate of authorization. In case the operation of service over trackage included in an adjustment or thereafter added is undertaken by another company during the term, the same may be recognized by the Postmaster General, provided the companies in interest shall file with him their joint agreement as to the part of the compensation of the old operating company to be paid the new operating company; otherwise payment to the company first authorized shall be full payment for all service performed for the term.

The Postmaster General may order service over trackage of a railroad company not operating service under an adjustment or authorization after the regular adjustment for the remainder of the term, and pay therefor at not exceeding \$42.75 per mile of trackage per annum.

Service over property owned or controlled by a terminal company shall be considered service of the roads or systems using such property and not that of the terminal company.

Railroad companies carrying the mails shall furnish all necessary facilities for caring for and handling them while in their custody. They shall furnish all cars or parts of cars used in the transportation and distribution of the mails, and place them in stations before the departure of trains when required to do so. They shall provide side, terminal, and direct transfer service and all station and depot space and rooms for handling, distribution, and transfer of mails en route, and for offices and rooms for the employees of the postal service engaged in such transportation when ordered by the Postmaster General.

Every railroad company carrying the mails shall carry on any train it operates and without extra charge therefor the persons in charge of the mails, and when on duty and traveling to and from duty, all duly accredited agents and officers of the Post Office Department and the postal service, while traveling on official business, upon the exhibition of their credentials.

All cars or parts of cars used for the Railway Mail Service shall be of such construction, style, length, and character, and furnished in such manner as shall be required by the Postmaster General, and shall be constructed, fitted up, maintained, heated, lighted, and cleaned by and at the expense of the railroad companies. No payment shall be made for service by any railway post-office car which is not sound in material and construction, and which is not equipped with sanitary drinking-water containers

and toilet facilities, nor unless such car is regularly and thoroughly cleaned. No pay for service shall be allowed for the operation of any wooden railway post-office car unless constructed substantially in accordance with the most approved plans and specifications of the Post Office Department for such type of cars, nor for any wooden railway post-office car run in any train between adjoining steel or steel underframe cars, or between the engine and steel or steel underframe car adjoining. After the first of July, nineteen hundred and seventeen, the Postmaster General shall not approve or allow to be used or pay for any full railway post-office car not constructed of steel or steel underframe or equally indestructible material, and not less than twenty-five per centum of the railway post-office cars of a railroad company not conforming to this provision shall be replaced with cars constructed of steel annually after June, nineteen hundred and thirteen; and all cars accepted for this service and contracted for by the railroad companies after the passage of this act shall be constructed of steel. The Postmaster General shall make deductions from the pay of the railroad companies on the basis of the value of the service computed on the car-foot-mile basis in all cases where the cars do not comply with the provisions of this act.

The space in cars devoted to the use of the mails, as ascertained during the period fixed by the Postmaster General for the rendition of information by the railroad companies, shall be taken as the basis for computing the car-foot miles devoted to the mail service for the purpose of readjustment, effective from the first of July next following: *Provided*, That no credit shall be given for space in cars devoted to the distribution of the mails unless such space shall be authorized by the Postmaster General or unless he shall determine that its use is made necessary by a specific authorization. In computing the car-foot miles, the mail service shall be charged in both directions for a line of railway post-office cars with the maximum space authorized in either direction.

If any railroad company shall fail or refuse to provide cars or apartments in cars for distribution purposes when required by the Postmaster General, or shall fail or refuse to construct, fit up, maintain, heat, light, and clean such cars and provide such appliances for use in case of accident as may be required by the Postmaster General, it shall be fined such sum as shall, in the discretion of the Postmaster General, be deemed proper.

The Postmaster General shall in all cases decide upon what trains and in what manner the mails shall be conveyed. Every railroad company carrying the mails shall carry on any train it operates all mailable matter directed to be carried thereon. If any railroad company shall fail or refuse to transport the mails when required by the Postmaster General upon any train or trains it operates, such company shall be fined such amount as may, in the discretion of the Postmaster General, be deemed proper.

The Postmaster General may make deductions from the pay of railroad companies carrying the mails under the provisions of this act for reduction in service or frequency of service where, in his judgment, the importance of the facilities withdrawn or reduced requires it, and impose fines upon them for delinquencies. He may deduct the price of the value of the service in such cases where it is not performed, and not exceeding three times its value if the failure be occasioned by the fault of the railroad company.

The Postmaster General is authorized to have such weights of mails and measurements of space taken and to collect such other information by sworn employees of the Post Office Department as he may deem necessary and to have such information stated and verified to him by such employees, under such instructions as he may consider just to the Post Office Department and the railroad companies, to assist in the ascertainment of the space used for the transportation and the handling of the mails on railroads, and to employ such special clerical and other assistance as shall be necessary to carry out the provisions of this act, and to rent quarters in Washington, District of Columbia, if necessary, for the clerical force engaged thereon, and to pay for the same out of the appropriation for inland transportation by railroads.

The provisions of this act shall apply to service operated by railroad companies partly by railroad and partly by steamboats.

The provisions of this act respecting the rate of compensation and the determination thereof shall not apply to mails conveyed under special arrangement in freight trains, for which a rate not exceeding the usual and just freight rates may be paid, in accordance with the classifications and tariffs approved by the Interstate Commerce Commission.

It shall be unlawful for any railroad company to refuse to carry the mails at the rates of compensation provided by law when and for the period required by the Postmaster General so to do, and for every such offense it shall be fined not exceeding \$5,000.

All laws or parts of laws inconsistent herewith are hereby repealed.

Closed-pouch mail service shall be the transportation and handling by railroad employees of mails on trains on which full or apartment railway post-office cars are not authorized, except as hereinbefore provided.

Side, terminal, and transfer mail service shall be the transportation of mails between railroad stations and post offices supplied therefrom and between railroad stations.

The Postmaster General shall, from July first, nineteen hundred and fourteen, restate the service upon the several routes as authorized under this act by making such authorizations of service of the several classes hereinbefore described as he may deem necessary and pay for the service performed in accordance therewith at not exceeding the following rates, namely:

For full railway post-office car mail service at not exceeding 20 cents for each mile of service by a sixty-foot car or its equivalent in authorized car space.

In addition thereto he may allow not exceeding \$1.45 as an initial rate and the same as a terminal rate for each one-way trip of a sixty-foot car, or a prorata part thereof for a car of less length, and not exceeding 12 cents for the first two thousand pounds or less, and 12 cents for each additional two thousand pounds of the average weight of mails loaded or unloaded at initial and terminal of each car run.

For apartment railway post-office car mail service at not exceeding 18 cents for each mile of service by the equivalent in authorized space of a sixty-foot car if the car be other than of steel construction, and 19 cents for each mile of service by the equivalent in authorized space of a sixty-foot car if the car be of steel construction.

In addition thereto he may allow not exceeding \$1.40 as an initial rate and the same as a terminal rate for each one-way trip of the equivalent in authorized space of a sixty-foot car, prorated to the authorized space, and not exceeding 12 cents for the first two thousand pounds or less and 12 cents for each additional two thousand pounds of the average weight of mails loaded and unloaded at initial and terminal of each car run.

For storage-car mail service at not exceeding 18 cents for each mile of service by a sixty-foot car or its equivalent in authorized space.

In addition thereto he may allow not exceeding \$1.30 as an initial rate and the same as a terminal rate for each one-way trip of a sixty-foot car or a pro rata part thereof for a car of less authorized length, and not exceeding 12 cents for the first two thousand pounds or less and 12 cents for each additional two thousand pounds of the average weight of mails loaded or unloaded at initial and terminal of each car run.

For closed-pouch service, on routes upon which closed-pouch service only is performed, at not exceeding ninety-five per centum of the rates of compensation provided by existing law for average daily weights of mail carried over the whole route; on routes upon which apartment railway post-office car and closed-pouch services are performed, at not exceeding \$20 per mile per annum for each two thousand pounds average daily weight of mails carried, and at pro rata of such rate of compensation for each one hundred pounds of average daily weight greater or less than two thousand pounds; and on routes upon which full railway post-office car and closed-pouch services or full railway post-office car, apartment car, and closed-pouch services are performed, at not exceeding \$19 per mile per annum for each two thousand pounds average daily weight of mails carried, and at pro rata of such rate of compensation for each one hundred pounds of average daily weights greater or less than two thousand pounds, the average daily weights to be ascertained in every case by the actual weighing of the mails.

For side, terminal, and transfer mail service the Postmaster General is authorized to provide, in his discretion, by regulation screen or other wagon, automobile, or mail messenger service under existing law, or to contract with the railroad company, after advertisement, for the performance of any or all service on its route. Postmasters at post offices of the third and fourth classes shall be eligible as contractors for this service.

Railroad companies whose railroads were constructed in whole or in part by a land grant made by Congress, on the condition that the mails should be transported over their roads at such price as Congress should by law direct, shall receive only eighty per centum of the compensation otherwise authorized by this act, excepting for side, terminal, and transfer mail service.

The initial and terminal rates provided for herein shall cover expenses of loading and unloading mails, switching, lighting, heating, cleaning mail cars, and all other expenses incidental to station service and required by the Postmaster General in connection with the mails that are not included in the car-mile rate. It shall be fixed upon the consideration of two elements, namely: First, loading and unloading mails, and, second, all other services rendered. For loading and unloading mails it shall not exceed 12 cents per ton, and for the remainder of the rate the allowance for full railway post-office cars, apartment railway post-office cars, and storage cars shall be varied in accordance with the approximate difference in their respective cost of construction and maintenance.

For the purpose of ascertaining the upon which to adjust compensation, to have such mails carried on the Post Office Department for such a number of days, at such times after July first, and not less frequently than once in a month, certified in such form and manner as the Postmaster General may determine. The number of mails per day carried on a railroad shall be used as the weighing period shall be used as the basis of mails and the compensation to be paid for the weighings, for assistance in compliance with the provisions of this act in Washington, District of Columbia, and for transportation by railroad routes.

In computing the car miles of the railway post-office cars the maximum space of a car run shall be regarded as the space mutually agreed upon.

In computing the car miles of storage of a round-trip car run shall be in both directions, unless the car be used by the Postmaster General otherwise mutually agreed upon.

New service and additional service herein provided, and service may be provided in pay, as the needs of the Postal Service may require, shall be allowed for additional compensation at the next regular readjustment of pay for the Postmaster General.

All cars or parts of cars used for the service shall be of the proper size, condition, style, length, and character, and shall be approved by the Postmaster General, and shall be lighted, and cleaned by and at the expense of the railway company. No car shall be allowed for service by any railway company unless it is of steel construction, and which is not equipped with toilet facilities, nor unless such car is reinforced with steel. No wooden car shall be allowed for service by any wooden car company unless it is substantially in accordance with the specifications of the Post Office Department for such type of car. No railway post-office car run in any train between two points shall be between a steel car adjoining. After the first of July, the Postmaster General shall not approve or allow for service by any railway post-office car not constructed of steel. No railway post-office car shall be constructed of structurable material, and not less than the specifications of the Post Office Department for such type of car. No railway post-office cars of a railroad company not constructed of steel shall be accepted for this service and compensation shall be constructed of steel. In cases where the service require it, the Postmaster General shall not approve or allow for service by any railway post-office cars of other than steel or such rate of compensation, within the limitation to the inferior character of construction service by such cars at such rates.

Service over property owned or controlled by a railway company shall be considered service of the railway company, and the Postmaster General shall be paid for as herein provided.

Railroad companies carrying the mails shall be responsible for and handling them while in their cars, and for the use of the cars used in the transportation and distribution of the mails as herein provided, and place them in station and when required to do so. They shall be responsible for the distribution, and transfer of mails in transit, and for the Post Office Department engaged in such transportation.

Every railroad company carrying the mails shall be responsible for and handling them without extra charge therefor the persons and traveling to and from duty, and all

Office Department and the Postal Service, while traveling on official business, upon the exhibition of their credentials.

If any railroad company carrying the mails shall fail or refuse to provide cars or apartments in cars for distribution purposes when required by the Postmaster General, or shall fail or refuse to construct, fit up, maintain, heat, light, and clean such cars and provide such appliances for use in case of accident as may be required by the Postmaster General, it shall be fined such sum as may, in the discretion of the Postmaster General, be deemed proper.

The Postmaster General shall in all cases decide upon what trains and in what manner the mails shall be conveyed. Every railroad company carrying the mails shall carry on any train it operates and with due speed all mailable matter, equipment, and supplies directed to be carried thereon. If any such railroad company shall fail or refuse to transport the mails, equipment, and supplies when required by the Postmaster General or any train or trains it operates, such company shall be fined such amount as may in the discretion of the Postmaster General be deemed proper.

The Postmaster General may make deductions from the pay of railroad companies carrying the mails under the provisions of this act for reduction in service or in frequency of service where, in his judgment, the importance of the facilities withdrawn or reduced requires it and impose fines upon them for delinquencies. He may deduct the price of the value of the service in cases where it is not performed, and not exceeding three times its value if the failure be occasioned by the fault of the railroad company.

The provisions of this act shall apply to service operated by railroad companies partly by railroad, and partly by steamboats.

The provisions of this act respecting the rates of compensation shall not apply to mails conveyed under special arrangement in freight trains, for which rates not exceeding the usual and just freight rates may be paid, in accordance with the classifications and tariffs approved by the Interstate Commerce Commission.

Railroad companies carrying the mails shall submit under oath, when and in such forms as may be required by the Postmaster General, evidence as to the performance of service.

The Postmaster General is authorized to have such weights of mails taken and ascertainment of needed space made and to collect such information by employees of the Post Office Department as he may deem necessary, and to have the same stated and verified to him by them under such instructions as he may consider just to the Post Office Department and the railroad companies, and to employ such clerical and other assistance as shall be necessary to carry out the provisions of this act, and to rent quarters in Washington, District of Columbia, if necessary, for the clerical force engaged thereon, and to pay for the same out of the appropriation for inland transportation by railroad routes.

The Postmaster General shall, from time to time, request information from the Interstate Commerce Commission as to the revenue received by railroad companies from express companies for services rendered in the transportation of express matter, and may, in his discretion, arrange for the transportation of mail matter other than of the first class at rates not exceeding those so ascertained and reported to him, and it shall be the duty of the railroad companies to carry such mail matter at such rates fixed by the Postmaster General.

The Postmaster General is authorized, in his discretion, to petition the Interstate Commerce Commission for the determination of a postal carload or less than carload rate for transportation of mail matter of the fourth class and periodicals, and may provide for and authorize such transportation, when practicable, at such rates, and it shall be the duty of the railroad companies to provide and perform such service at such rates and on the conditions prescribed by the Postmaster General.

The Postmaster General may, in his discretion, distinguish between the several classes of mail matter and provide for less frequent dispatches of mail matter of the third and fourth classes and periodicals, when lower rates for transportation or other economies may be secured thereby without material detriment to the service.

The Postmaster General is authorized to return to the mails, when practicable for the utilization of car space paid for and not needed for the mails, postal cards, stamped envelopes, newspaper wrappers, empty mail bags, furniture, equipment, and other supplies for the Postal Service, theretofore withdrawn from the mails as provided by law and transported by freight or express, and thereafter transport them in the railway post-office cars and storage cars herein provided for.

The Postmaster General in cases of emergency between October first and April first of any year, may hereafter return to the mails empty mail bags and other equipment

theretofore withdrawn therefrom as required by additional authorization of car space under the transportation thereof as provided for herein out of transportation by railroad routes.

The Postmaster General may have the weights and computations of the average loads of the sections for statistical and administrative purposes; and pay the expense thereof out of the appropriate railroad routes.

It shall be unlawful for any railroad company to the rates of compensation provided by law when the Postmaster General so to do, and for every such offense \$5,000.

All laws or parts of laws inconsistent herewith are

Study of this bill soon convinced our was unscientific and most undesirable, dangerous powers to the Postmaster General which, if adopted, would be absolutely correct

FOURTH DEPARTMENT

The demonstration and ultimate result of its mistakes in its third bill resulted in of Representatives of a draft of what is known

For the information of the reader we 14, and 15 of this bill (H. R. 17042, Un only sections which refer to the subject namely, "Compensation for the transportation

SEC. 13. That the Postmaster General is authorized compensation to be paid to railroad companies for and fourteen, or as soon thereafter as may be practicable handling of the mails and furnishing facilities a with upon the conditions and at the rates hereinafter

The Postmaster General may state railroad mail thereon of the following five classes, namely: Full apartment railway post-office car service, storage-car side and transfer service.

Full railway post-office car mail service shall be in length, constructed, fitted up, and maintained trains. The authorizations of full railway post-office cars sixty feet in length, inside measurement, except

Apartment railway post-office car mail service shall than forty feet in length in cars constructed and distribution of mails on trains. Two standard size cars may be authorized and paid for, namely, apartment in length, inside measurement, except as hereinafter

Storage-car mail service shall be service by cars for mails in transit other than by full and apartment rail authorizations for storage cars shall be for cars sixty feet in length as hereinafter provided: *Provided*, That less than six authorized in baggage cars on trains upon which full apartment railway post-office cars are not operated.

Service by full and apartment railway post-office the carriage therein of all mail matter, equipment, and the employees of the Postal Service or Post Office by the Postmaster General to be so carried.

Closed-pouch mail service shall be the transportation of mails on trains on which full or apartment authorized, except as hereinbefore provided.

Side and transfer mail service shall be the transportation of mails at stations and post offices supplied therefrom and be

The rates of payment for the services authorized in accordance with this act shall be as follows, namely:

For full railway post-office car mail service at not exceeding 20 cents for each mile of service by a sixty-foot car.

In addition thereto he may allow not exceeding \$2 as an initial rate and the same as a terminal rate for each one-way trip of a sixty-foot car.

For apartment railway post-office car mail service at not exceeding 10 cents for each mile of service by a thirty-foot apartment car, and 5 cents for each mile of service by a fifteen-foot apartment car.

In addition thereto he may allow not exceeding \$1 as an initial rate and the same as a terminal rate for each one-way trip of a thirty-foot apartment car, and 50 cents as an initial rate and the same as a terminal rate for each one-way trip of a fifteen-foot apartment car.

For storage-car mail service at not exceeding 18 cents for each mile of service by a sixty-foot car.

In addition thereto he may allow not exceeding \$2.50 as an initial rate and the same as a terminal rate for each one-way trip of a sixty-foot car.

Where authorizations are made for cars of the standard lengths of sixty, thirty, and fifteen feet, as provided by this act, and the railroad company is unable to furnish such cars of the length authorized, but furnishes cars of lesser length than those authorized, but which are determined by the department to be sufficient for the service, the Postmaster General may accept the same and pay only for the actual space furnished and used, the compensation to be not exceeding pro rata of that provided by this act for the standard length so authorized: *Provided*, That the Postmaster General may accept cars and apartments of greater length than those of the standard requested but no compensation shall be allowed for such excess lengths.

For closed-pouch service, on routes upon which closed-pouch service only is performed, at not exceeding ninety-five per centum of the rates of compensation provided by existing law for average daily weights of mail carried over the whole route; on routes upon which apartment railway post-office car and closed-pouch services are performed, at not exceeding \$20 per mile per annum for each two thousand pounds average daily weight of mails carried, and at pro rata of such rate of compensation for each one hundred pounds of average daily weight greater or less than two thousand pounds; and on routes upon which full railway post-office car and closed-pouch services or full railway post-office car, apartment-car, and closed-pouch services are performed, at not exceeding \$19 per mile per annum for each two thousand pounds average daily weight of mails carried, and at pro rata of such rate of compensation for each one hundred pounds of average daily weights greater or less than two thousand pounds, the average daily weights to be ascertained in every case by the actual weighing of the mails.

For side and transfer mail service the Postmaster General is authorized to provide, in his discretion, by regulation screen or other wagon, automobile, or mail messenger service under existing law, or to contract with the railroad company, after advertisement, for the performance of any or all service on its route. Postmasters at post offices of the third and fourth classes shall be eligible as contractors for this service.

Railroad companies whose railroads were constructed in whole or in part by a land grant made by Congress, on the condition that the mails should be transported over their roads at such price as Congress should by law direct, shall receive only eighty per centum of the compensation otherwise authorized by this act, excepting for side and transfer mail service.

The initial and terminal rates provided for herein shall cover expenses of loading and unloading mails, switching, lighting, heating, cleaning mail cars, and all other expenses incidental to station service and required by the Postmaster General in connection with the mails that are not included in the car-mile rate. The allowance for full railway post-office cars, apartment railway post-office cars, and storage cars may be varied in accordance with the approximate difference in their respective cost of construction and maintenance.

For the purpose of ascertaining the average weight of closed-pouch mails per day upon which to adjust compensation, the Postmaster General is authorized and directed to have such mails carried on the several routes weighed by the employees of the Post Office Department for such a number of successive days, not less than thirty-five, at such times after July first, nineteen hundred and fourteen, as he may direct, and not less frequently than once in every year thereafter, the result to be stated and certified in such form and manner as he may direct. In computing the average weight of mails per day carried on a railroad route, the whole number of days included in

the weighing period shall be used as a divisor. of mails and the compensation to tabulators as with the weighings, for assistance in completing necessary, in Washington, District of Columbia, shall inland transportation by railroad routes.

In computing the car miles of the full railway way post-office cars, the maximum space authorized car run shall be regarded as the space to be computed mutually agreed upon.

In computing the car miles of storage cars, the direction of a round-trip car run shall be regarded both directions, unless the car be used by the company otherwise mutually agreed upon.

New service and additional service may be authorized herein provided, and service may be reduced or discontinued in pay, as the needs of the Postal Service may require. Pay shall be allowed for additional closed-pouch service the next regular readjustment of pay therefor on the date shall be allowed for additional car service unless otherwise authorized by the Postmaster General.

All cars, or parts of cars, used for the railroad mail service, of any material, style, length, and character, and furnished by the Postmaster General, and shall be constructed, lighted, and cleaned by and at the expense of the Postal Service. No pay shall be allowed for service by any railway post-office material and construction, and which is not equipped with containers and toilet facilities, nor unless such cars are constructed substantially in accordance with the regulations of the Post Office Department for such type of full railway post-office car run in any train between the engine and a steel car adjoining. After the first of July, nineteen hundred and seventeen, the Postmaster General shall not approve for service by, any full railway post-office car not constructed of equally indestructible material, and not less than the full railway post-office cars of a railroad company in use on August twenty-fourth, nineteen hundred and seventeen. No railway post-office cars accepted for this service by railroad companies hereafter shall be constructed of steel. In cases of emergency and in cases where the Postmaster General may require it, the Postmaster General may provide for the use of cars of other than steel or steel underframe construction, but the compensation within the maximum herein provided for the inferior character of construction, and the rates for use by such cars at such rates so fixed.

Service over property owned or controlled by any company shall be considered service of the railroad company, and not that of the other or terminal company: *Provided*, that the railroad shall be paid for as herein provided.

Railroad companies carrying the mails shall be responsible for caring for and handling them while in their cars or parts of cars used in the transportation and distribution herein otherwise provided, and place them in storage at such times and when required to do so. The rooms for handling, distribution, and transfer of mail, and rooms for the employees of the Postal Service engaged in the service, shall be provided by the Postmaster General.

Every railroad company carrying the mails shall be responsible without extra charge therefor the persons in charge of the mail, and traveling to and from duty, and all duly authorized persons of the Post Office Department and the Postal Service, upon the exhibition of their credentials.

If any railroad company carrying the mails shall fail to provide apartments in cars for distribution purposes when required, or shall fail or refuse to construct, fit up, maintain

provide such appliances for use in case of accident as may be required by the Postmaster General, it shall be fined such reasonable sum as may, in the discretion of the Postmaster General, be deemed proper.

The Postmaster General shall in all cases decide upon what trains and in what manner the mails shall be conveyed. Every railroad company carrying the mails shall carry on any train it operates and with due speed all mailable matter, equipment, and supplies directed to be carried thereon. If any such railroad company shall fail or refuse to transport the mails, equipment, and supplies when required by the Postmaster General on any train or trains it operates, such company shall be fined such reasonable amount as may, in the discretion of the Postmaster General, be deemed proper.

The Postmaster General may make deductions from the pay of railroad companies carrying the mails under the provisions of this act for reduction in service or in frequency of service where, in his judgment, the importance of the facilities withdrawn or reduced requires it and impose fines upon them for delinquencies. He may deduct the price of the value of the service in cases where it is not performed, and not exceeding three times its value if the failure be occasioned by the fault of the railroad company.

The provisions of this act shall apply to service operated by railroad companies, partly by railroad, and partly by steamboats.

The provisions of this act respecting the rates of compensation shall not apply to mails conveyed under special arrangement in freight trains, for which rates not exceeding the usual and just freight rates may be paid, in accordance with the classifications and tariffs approved by the Interstate Commerce Commission.

Railroad companies carrying the mails shall submit under oath, when, and in such form as may be required by the Postmaster General, evidence as to the performance of service.

The Postmaster General is authorized to employ such clerical and other assistance as shall be necessary to carry out the provisions of this act, and to rent quarters in Washington, District of Columbia, if necessary, for the clerical force engaged thereon, and to pay for the same out of the appropriation for inland transportation by railroad routes.

The Postmaster General shall, from time to time, request information from the Interstate Commerce Commission as to the revenue received by railroad companies from express companies for services rendered in the transportation of express matter, and may, in his discretion, arrange for the transportation of mail matter other than of the first class at rates not exceeding those so ascertained and reported to him, and it shall be the duty of the railroad companies to carry such mail matter at such rates fixed by the Postmaster General.

The Postmaster General is authorized, in his discretion, to petition the Interstate Commerce Commission for the determination of a postal carload or less-than-carload rate for transportation of mail matter of the fourth class and periodicals, and may provide for and authorize such transportation, when practicable, at such rates, and it shall be the duty of the railroad companies to provide and perform such service at such rates and on the conditions prescribed by the Postmaster General.

The Postmaster General may, in his discretion, distinguish between the several classes of mail matter and provide for less frequent dispatches of mail matter of the third and fourth classes and periodicals, when lower rates for transportation or other economies may be secured thereby without material detriment to the service.

The Postmaster General is authorized to return to the mails, when practicable for the utilization of car space paid for and not needed for the mails, postal cards, stamped envelopes, newspaper wrappers, empty mail bags, furniture, equipment, and other supplies for the Postal Service.

The Postmaster General, in cases of emergency between October first and April first of any year, may hereafter return to the mails empty mail bags and other equipment theretofore withdrawn therefrom as required by law, and, where such return requires additional authorization of car space under the provisions of this act, to pay for the transportation thereof as provided for herein out of the appropriation for inland transportation by railroad routes.

The Postmaster General may have the weights of mail taken on railroad-mail routes and computations of the average loads of the several classes of cars and other computations for statistical and administrative purposes made at such times as he may elect, and pay the expense thereof out of the appropriation for inland transportation by railroad routes.

It shall be unlawful for any railroad company to refuse to perform mail service at the rates of compensation provided by law when and for the period required by the Postmaster General so to do, and for every such offense it shall be fined not exceeding \$5,000.

carry mail. They are supposed to have accepted the rates as a unitary act, which in itself was assumed to be sufficient guarantee that rates will not be too low, and it was only necessary for Congress to fix maximum rates; but this assumption was not sound, as a road would hardly dare to refuse to carry mail because of irritation resultant from such action in the community in which the road operates.

The Interstate Commerce Commission is now authorized to fix maximum freight rates, it being left to the railroads to fix the minimum. It would be considered preposterous that the commission should fix the maximum rates at which railroads must carry freight and leave the shippers to fix the minimum, or for State commissions to fix maximum passenger rates, leaving passengers to fix the minimum, yet this is the very thing that the Post Office Department proposes for mail pay in the departmental bill. Congress is to fix the maximum rates and the shipper—the Post Office Department—is to fix the minimum rates, and the railroads are to be compelled to carry the mail and the postal employees accompanying same. This is a proposition without parallel in the history of rate making.

THE COMMERCIAL BASIS.

The Post Office Department contends that "rates for carrying the mails on railroads should be less than those which might be fixed for commercial business." We believe that railroads are entitled to be paid for mail transportation on a commercial basis.

It is suggested by the Post Office Department that the Government might be favored with rates lower than those warranted on a commercial basis, because of the following considerations:

1. The certainty, constancy, and homogeneity of traffic.
2. The certainty and regularity of payment.
3. Railroads are not built primarily to carry mails.
4. The protection to their mail trains which railroads, as Government agencies, receive against unlawful acts in interference with or obstruction of the mails carried.
5. The principle of public utility.

Full consideration of this argument convinces us that this is fallacious. The money paid for freight, passenger, express, and mail transportation is all ultimately paid by the public. Fair rates should be made in all branches of traffic, otherwise a deficiency of return from one branch must be made up by an overcharge from another branch. The Government is the people organized. The patrons of the freight or passenger train services are the public unorganized. We see no reason for favoring the people organized as against the people unorganized.

Regarding the certainty of the traffic, some claim that the railroads are not compelled to spend as much to get the mail traffic in the way of advertising and traffic bureaus as in the case of the passenger traffic proper, and argue that this would tend to make the mail car somewhat less expensive per mile than the regular passenger car; but even if this were a fact, it is in no wise in conflict with the commercial principle. To make rates correspond with differences in expense is merely an application of that principle. We shall return to this difference between the mail car and passenger car in another chapter.

Unfortunate also is the analogy between the commerce and passenger traffic. The making of low fares for passengers in a car is not the earnings per car mile for passenger service. Only in its regard as a by-product, as the regular passenger traffic.

The "homogeneity" of the imagination. In what sense homogeneous we will allow the Government's quotation on this subject the days of the parcel post.

In the matter of the cost, the reason for regarding the payment once a month for in advance from the passengers millions of passengers make check a month, but, if so, without departing from the

It is said that railroads. This may be true. They can be developed, and, as a great branch of that traffic proportionate share of the

The protection of mail traffic as something upon which to ask the railroads to make that the armed force of the them in case of labor trouble.

We are asked to consider the reason for departing from the roads accept a low rate of develop a given territory, make a special rate on necessity. The desirability of into account in fixing the price it is not clear that this Government should pay the railroads less than a normal salary manufacturer of desks make a department because the money. Then why should the railroads be used by the Government at an abnormally low rate normal rate?

The money paid for passenger is all ultimately paid by the branches of the traffic, and can be made up by a tax laid

The patrons of either the no more and no less than a no more and no less than a

Railway cost accounting is in an undeveloped state, and it does not seem possible to reach absolute conclusions on the basis of cost at the present time, but the goal should be, in future tests of the fairness of the rates which we recommend, to assign to each service those expenses which can be assigned directly and to apportion upon equitable bases those expenses which are common to the various services.

In the meanwhile we are confident that our general plan is sound, and if enacted into law will always be retained, and that our suggested rates will be found reasonable, though probably slightly too low.

CHAPTER V.

WHAT IS A REASONABLE AND JUST R. MAIL BY RAILROAD

The annual appropriation by Congress be looked upon as the price to be paid for services from private corporations. As the Government should be viewed as the people unorganized—that is, a myriad of individuals—are also purchasers of transportation services from private corporations. Can there be any difference between what people organized should pay and that which people unorganized should pay, except as that difference may be for the better or for the improvement of the service?

If 15 passengers collectively should pay for 1 mile of transportation in a passenger car, should not the Government pay for the same service? Why should the public in one case be treated differently from the public in another case?

It would seem that the same principle should govern passenger rates or freight rates are just as much in the determination of what is a just and reasonable rate.

If it were possible at this time to discontinue the mail service and the fair value of the property therein, then the cost including taxes paid on the capital employed might be determined. As this information is not available, as for over 20 years the Interstate Commerce Commission has made no report for railway passenger and other operations made to the Interstate Commerce Commission as a Government body. Had these reports been filed with, and tabulated and presented to the Commission, our study of railway mail rates would be easier, as we would have had definite information with which to work down our own apportionment of the cost of the service. The cost of the service should be charged to mail steam railroad.

A start in the right direction has been made in the opinion of the Interstate Commerce Commission in its report of 1914, "In the matter of the separation of passenger and freight rates." In its annual report of 1914, the Commission announced the future policy of the Commission to the effect that it will revise its present Circular No. 1, so that progress can be made, carriers will be asked to report the year ending June 30, 1915, and as early as possible of Class I, namely, those roads whose gross revenue is \$1,000,000 a year, will be required to apportion their expenses between passenger and freight. The rates will be prescribed.

Whatever may be possible in the future, at this time we can not get conclusive cost and investment data on this subject. Such information regarding cost as has been presented at the hearings has been considered and is not inconsistent with the conclusions we have reached on the basis of comparative earnings. In the determination of what is a reasonable rate, we have been influenced chiefly by a comparison with the railroad earnings from the passenger service.

It is true, when the rates in one service are judged by comparison with rates in another, the question immediately arises as to the reasonableness of the rates used as the standard. If passenger earnings are used as a standard, must we not first demonstrate that passenger earnings are just and reasonable? Unquestionably so.

PASSENGER REVENUES A FAIR BASIS FOR COMPARISON.

The passenger earnings of various railroads have for many years been under close scrutiny by the various State commissions. Many States have fixed the passenger rates by statute; and such statutes have been attacked and defended before our courts. In a recent decision regarding advanced rates the Interstate Commerce Commission has indicated the opinion that passenger rates should be increased. Therefore we proceed on the assumption that passenger rates are not too high. Clearly, no satisfactory comparison can be made with the freight service. It might be argued that our standard of comparison should be the express service rather than the passenger service proper. This comparison will be examined in detail in Chapter VI. Suffice it to say here that we know of no comprehensive investigation of the reasonableness of the relations between express companies and railroads, and, furthermore, no reliable information exists as to the railroad earnings from express traffic on the basis of any unit common to the mail and express service. Absolutely the only figure which the Interstate Commerce Commission could furnish us that we could use as a standard for judging of a reasonable mail rate is the average earning per passenger-train car mile. This is an average derived from statistics compiled regularly, year after year, and not with reference to any particular case. The following is the letter received from the secretary of the Interstate Commerce Commission on this subject:

MARCH 24, 1913.

HON. JONATHAN BOURNE,

*Chairman Joint Committee on Transportation of Mail,
United States Senate, Washington, D. C.*

DEAR SIR: Answering yours of the 20th instant inquiring concerning the average car-mile revenue for passenger-train service, I have to say that from compilations made in the division of statistics of this commission from annual reports of railway companies for the year ended June 30, 1911, it appears that for what we denominate class 1 roads, being those whose operating revenues for the year exceeded \$1,000,000, the average revenue per car-mile from passenger-train service is 25.35 cents; for class 2 roads, being those having operating revenues for the year below \$1,000,000 and above \$100,000, the corresponding figure is 28.59 cents; for class 3 roads, being those whose operating revenues for the year were less than \$100,000, the corresponding figure is 27.45 cents; and for all three classes the figure averages at 25.43 cents.

Owing to the fact that the reports of car mileage and revenues made to this commission in the annual reports of common carriers are not segregated with sufficient detail to enable us to state the revenue derived from the passenger service per car-mile, we are unable to comply with the second request contained in your letter.

It is to be noted that this average is to the average for the five years 1900-1904. It is desirable to have the average baggage cars, separately, if the passenger train cars, passenger, mail and baggage standard. That this, if it could be secured, is certain. How much above

The passenger train car miles We may take the mail space as miles in 1911 and the express c figure being derived by dividing t 22.647 cents, given by the Post express revenue, which was \$70,7 have left the passenger train car i of 2,564,774,476. Dividing this with mail and express excluded, y

This brings us to the question of the same rate per car mile as the messenger service. The evidence bears of an exact appraisal of the difference between the mail service and the messenger service per car mile.

Some members of the committee at least fully equal to the passenger. From this point of view, as heretofore, in practically all instances mail car service on passenger trains. In point of freedom of mail service is coincident with passenger or diminution in passenger service, or diminution in mail service to improve passenger service tends to increase expenditures of the railways which

¹ The following figures are obtained by dividing and other passenger-train revenue, but excluding such items as baggage, mail, express, and other passenger services. The figures for 1911 differ slightly from those reported by the Interstate Commerce Commission to the chairman of the Senate Committee on Commerce in a letter made in preparing that letter which it is not practical to reproduce.

1908.....	
1909.....	
1910.....	
1911.....	
1912.....	
Five-year average (1908-1912).....	

service effect an improvement in the mail service as well. While there are some expenditures in the passenger department of the railway service that seem at first thought to be exclusively for the benefit of the passenger service and not directly beneficial to the mail service, yet a close study of the matter will show that all expenditures which facilitate the handling of passenger service and improve that branch of the service in either frequency, speed, regularity, or safety aid very materially, though indirectly, in the development and improvement of mail transportation.

Some persons assert that the mail service is a wholesale traffic, while the passenger service is a retail traffic, and for this reason they think the mail pay per car mile should be slightly less than the passenger revenue per car mile. It should not be lost sight of, however, that although the passenger traffic is in the nature of a retail traffic, yet the passenger pays for his service in advance, while the Government pays only at the end of the month, and sometimes after greater delay than that owing to controversy over the amount due. Moreover, the Government penalizes the railroads for failure of service and for delays, while no such forfeiture is required in the case of passenger traffic. Regulations provide that where interruption of traffic occurs, mail shall be given the first opportunity for movement. It is also required that mail shall be carried upon fast trains without additional compensation, although upon some of the limited trains passengers are required to pay an additional fare.

The final rates agreed upon by our committee are somewhat below the level of the passenger earnings, being an average of 24.69 cents (ignoring the land-grant deduction, which would reduce this rate slightly), as against the 26.45 cents for passenger car-mile revenue indicated on page 87. This difference corresponds approximately with the difference in expense allowed by the Post Office Department. As shown in detail on page 97, the department has presented figures estimating that the mail service is 5.78 per cent less expensive than the average of the passenger train service per car mile. This percentage, deducted from the passenger car-mile earnings of 26.45 cents, leaves 24.92 cents, as compared with the average of 24.69 cents, which is the estimated average yield per car mile under the rates recommended by the joint committee.

DESIRABILITY OF UNIVERSAL RATE.

In most of the discussions before the joint committee it has been assumed that whatever mail rate shall be decided upon, it would be the universal rate for the whole of the United States, regardless of geographical or traffic conditions. This has been the custom hitherto in all legislation on this subject. Obviously a rate that is fair for one railroad is not likely to be exactly fair for every other railroad. Nevertheless, we find there is a considerable similarity in the average passenger train car-mile earnings in various sections of the country. It is true that this average is higher for the New England States and for the far Western States than for the country as a whole, but we have concluded that any attempt to adjust for varying traffic conditions would complicate the subject with little likelihood of any more accurate or satisfactory adjustment than will be achieved by the universal rate schedule. The

schedule which we have recommended automatically takes account of differences in lengths of haul, and by making relatively higher rates for apartment cars and closed-pouch service than for whole R. P. O. cars, will also automatically increase the rates to the branch lines and other lines of light traffic. It may be that future studies in cost accounting will make it desirable to have a separate rate schedule for roads lying in mountainous territory or contending with other permanent natural difficulties. But for the present we do not think it wise to attempt to change the well-established custom of having one universal rate schedule for mail transportation by rail.

CHAPTER VI.

COMPARISON OF MAIL AND EXPRESS EARNINGS.

In a search for a test of the reasonableness of payments made to railroads for the carriage of mail, comparison with the railroad earnings from express is frequently attempted.

At the outset, we would question the pertinency of such comparison because we have no assurance that equitable relations exist between the railroads and express companies. There does not appear to have been any comprehensive investigation of that relationship. The Interstate Commerce Commission has stated that it has not taken the contracts between express companies and the railroads into consideration in making express rates. (In the matter of *Express Rates*, No. 4198, 1913, p. 141.) Railroads and express companies are in a partnership, sharing in the gross receipts on a percentage basis. Existing contracts between express companies and railroads were entered into on the basis of express rates in force prior to February, 1914, at which time reduced rates and new conditions were imposed by Government authority. Hence, it would be entirely unwarranted to assume that the present payments to railroads by express companies can afford any satisfactory basis for comparison.

Nevertheless, we shall proceed to examine the two services and the return to railroad companies from each.

The express service undoubtedly costs the railroads less than the mail per car-mile. Railway employees help to load and unload mail but not express matter, except where employees are jointly paid by the railroad and express companies. Express companies do not have the right to designate the trains they will utilize, but the Postmaster General may order mail service on any train. Express cars are cheaper than equipped mail cars. Railroad companies are liable for injuries to mail clerks but not for injuries to express employees. No fines and penalties, such as the Postmaster General imposes on railroad companies, are imposed by express companies. The express car carries a heavier load per car mile, but the gross weight of the car and its contents is probably less than that of the railway post-office car, so that the expense of hauling is probably less per car, but this additional tonnage per car necessarily reduces very materially the cost of hauling per ton-mile. Thus, if the cost in the two cases be assumed to be 18 cents a car-mile, a load of 3 tons of express matter means 6 cents per ton-mile, while a load of 2 tons of mail means 9 cents per ton-mile. The arrant absurdity of comparing ton-mile earnings from mail and express without regard to the difference in the average load per car must be apparent.

But there are other and more important differences between the mail and express services. Express matter is handled at all times by express company employees. A railroad company not only handles the mail at and in stations but in a great many instances bears the expense of transporting mail between the station and the post office. The railroad company furnishes cranes for placing mail aboard cars in the smaller towns and supplies trucks for handling mail at stations in all towns of considerable size. No such service is rendered the express companies.

mittee relating to the month of November, 1909, shows a decidedly lower earning from mail than from express on a car-mile basis.

2. COMPARATIVE EARNINGS ON A TON-MILE BASIS.

No accurate information is available on this point. A representative of the railroads gave figures from various sources of 7.4, 7.7, and 7.5 cents per ton per mile as the average railroad revenue from express. (Hearings, pp. 122-123.) The department gives 8.004 cents as the railroad earning from express per ton-mile. (Hearings, p. 1279.) The ton-mile payment for mail transportation, including R. P. O. service, has been calculated by the department at 10.04 cents. (Hearings, p. 852.) But the higher load per car in the express service is undisputed. The load per car in the express service was given by the department in the hearings (p. 1279) at 2.57 tons, but this has been corrected in a letter of May 28, 1914, to read 2.73 tons, as against a mail load of 2.26 tons per car. Both figures are estimates on very uncertain foundations and the quotation of them here should in no sense be taken as our finding that they are even probably correct. But when these loads are multiplied by the ton-mile rates given above (2.73 by 8.004 cents and 2.26 by 10.04), we get car-mile earnings for express of 21.85 cents and for mail of 22.69 cents. These results are in conflict with the car-mile earnings for November given above, namely, 22.647 cents for express and 20.22 for mail and show the unreliability of these statistics furnished us by the department. We conclude that no data exist for obtaining decisive results from the comparison of mail and express earnings on a ton-mile basis, and that such comparisons are worthless unless accompanied by specific information as to the load per car.

3. COMPARISON OF RATES PER 100 POUNDS AND PER PACKAGES OF LOWER WEIGHT.

Figures were submitted by the department comparing the average payments for mail transportation between specific cities per 100-pound and per 40-pound packages, with 50 per cent of the first-class express rates recently approved by the Interstate Commerce Commission, the 50 per cent being taken as the railroad company's share of the earnings. (Hearings, pp. 1272-1277.) The comparison is considerably affected by the length of haul and the size of the parcel taken for comparison, since the express rate per pound is less on a 100-pound parcel than on a 40 or a 30 pound parcel. The following is an illustration of the range of express rates as the weight of parcel varies (I. C. C. In the matter of express rates, rate scale 14):

Weight of parcel.	Rate per parcel.	Rate per pound.
<i>Pounds.</i>		
1.....	\$0. 21	\$0. 2100
10.....	.30	.0300
20.....	.40	.0200
30.....	.50	.0167
32.....	.52	.0162
34.....	.54	.0158
36.....	.56	.0155
38.....	.58	.0152
40.....	.60	.0150
50.....	.70	.0140
75.....	.95	.0126
100.....	1. 20	.0120

No reliable data are available as to the average weight of an express parcel to-day, and without such data a comparison of rates on parcels of specific weights is of practically no value. If the average weight be 10 pounds, the revenue per pound will be double what it would be if the average be 40 pounds. Comparison of mail revenue with revenue from 40 to 100 pound express parcels would undoubtedly show that the mail compensation per pound between the selected points is in the majority of cases above the 50 per cent of the express rates, but no useful conclusion can be based upon uncertain premises. It seems to have been overlooked by the department (and also by the railroad representatives in their discussion of this exhibit) that a comparison of rates between specific points is only another form of a comparison on a ton-mile basis.

When we are told that between Akron, Ohio, and Pittsburgh, Pa., for example, a distance of 132.06 miles, the Government pays 30 cents for a 40-pound package of mail while the express company pays the railroad 26 cents for hauling 40 pounds of express matter, this is equivalent to 11.36 cents per ton-mile for mail and 9.84 cents per ton-mile for express. Thus all that has been said on pages 90 and 92 regarding comparisons on a ton-mile basis would apply here. With the average load per car of 2.73 tons and 2.26 tons for express and mail, respectively (used here for illustration but not approved), the above ton-mile rates become 25.57 cents for mail and 26.86 cents for express per car-mile, thus reversing the showing.

We are compelled to reject the department's attempt to show higher relative railroad earnings from mail as reckless and misleading. Any comparison with express at this time of experimentation under the new rates prescribed by the Interstate Commerce Commission must be unconvincing, and it seems clear that when the comparison is made before these new rates went into effect, the evidence before us shows a relatively higher earning from express than from mail, taking the railroads as a whole, although several roads admit that per car-foot mile their express earnings were less than their mail earnings. (Hearings, pp. 335 and 526.)

The Northern Express Co., operating over the Northern Pacific, reports that the records of the latter company show that for the year ending June 30, 1912, the compensation paid by it to that railway was equal to 3.56 mills per car-foot mile, while from the Post Office Department the payments were equivalent to 2.92 mills per car-foot mile. (Hearings, p. 744.) These figures are equivalent to 21.36 cents and 17.52 cents per 60-foot car mile for express and mail, respectively. While the express may be somewhat the cheaper of the two services for the railroad to perform, the differences expressed in money would probably be relatively small. (Hearings, p. 1395.)

Suffice it to say that we are convinced that the railroad earnings from mail were in 1909 decidedly lower than from express on a car-mile basis, which is the best basis for comparison we have. Certainly there is no warrant in the oft-repeated assertion that the Government is being robbed in its mail payments by comparison with what the express companies pay. There has been an amazing amount of reckless assertion on this subject.

4. COMPARISON ON BASIS OF INCREASE IN EARNINGS.

We have finally to consider the evidence as to the relative growth in the total revenues to railroads from these two services. The following table shows the railroad revenue from mail and express, respectively, for the 10 years ending June 30, 1912, according to the statistics published by the Interstate Commerce Commission:

Year.	Mail revenue. ¹	Express revenue.
1903.....	\$41, 709, 306	\$38, 321, 84
1904.....	44, 490, 732	41, 875, 68
1905.....	45, 420, 125	45, 149, 13
1906.....	47, 371, 453	51, 010, 86
1907.....	50, 378, 964	57, 322, 95
1908.....	48, 537, 708	58, 082, 06
1909.....	49, 391, 681	59, 647, 02
1910.....	48, 946, 052	67, 190, 22
1911.....	50, 702, 625	70, 776, 17
1912.....	50, 935, 866	73, 208, 73
Percentage of increase.....	22	91

¹ It will be noted that the figures in this column are not identical with the figures taken from Post Office Department reports and presented on page 61. The difference is apparently due to the fact that the Post Office Department's reports cover all audited expenditures under this item, while the Interstate Commerce Commission reports cover only mail revenues reported to the commission by the railroads. Some railroads make incomplete or defective reports.

This shows a much more rapid increase in the express revenue than in the mail revenue received by the railroads. Such a comparison can not be taken as evidence as to the earnings from each service per unit of traffic, but it does show that the express payments have been responsive to the growth in traffic while the mail payments clearly have not.

Specific comparisons of railroad mail and express earnings were submitted by the department near the close of the hearings (pp. 1271-1278), and the reply thereto by the railroad representatives (pp. 1334-1341) showed clearly that more detailed investigation must be made to arrive at any satisfactory comparison of mail and express earnings. The Second Assistant Postmaster General himself seemed to feel this, for he was unwilling to base his own rates on the results of his comparisons. He stated that he at no time said that the railroads should be paid only what they received from the express companies for handling the express business. (Hearings, p. 1510.) Being asked specifically what weight he would attach to the data regarding mail and express earnings, he replied, "I would give this weight to it, that I would not increase the rates which we have suggested here" (p. 1511).

As was said in the beginning, we do not regard comparisons with the express service as conclusive evidence. The Government should pay a just price for every service received. If the relations between the express companies and railroads are inequitable to the stockholders of either, perhaps the example thus set by the Government will stimulate an examination and rearrangement of the contracts between the railroads and express companies.

MAIL TRAFFIC.

Cars must be built according to Post Office Department specifications, including post-office features, which diminish the paying carrying capacity, and are subject to alteration on demand of the Post Office Department.

Entire space on which revenue per car-foot mile is based is furnished and maintained by railroad company.

Our standard 60-foot mail car costs more than \$10,000 to construct, and is very expensive to maintain. The weight of standard 60-foot mail car is generally in excess of 116,000 pounds.

The railroads incur extra expense for extra switching of mail cars for loading, unloading, and advance distribution, including placing and lighting at station a considerable time before departure of trains.

Railroads are held liable for personal casualties to railway mail employees carried free, and must also transport agents and inspectors of Post Office Department without charge.

Mail must be carried on fastest passenger trains, mail trains making a higher speed than the average for passenger traffic. Railroads subject to fine for delays.

Railroads pay for loading and unloading cars, and must provide room for mail at stations.

PASSENGER TRAFFIC.

No such requirements, and railroads can utilize entire floor space of coaches for seats, with necessary aisles. There is also nothing to limit loading of baggage car to space capacity.

As above shown, a large part of the space on which passenger earnings per car-foot mile are based is furnished and maintained by the sleeping-car company without cost to railroad companies. Carrying capacity of sleeping cars is less than one-half that of coaches, and at least a partial deduction of such space is only fair when comparing returns per car-foot mile with mail, as the railroads are relieved of ownership and maintenance expenses, including depreciation and taxes on these cars, and for the further reason that the passenger has to pay an additional charge to the sleeping-car company for the privilege of occupying these cars. For passengers in coaches only, the revenue per car-foot mile is much in excess of that for mail service.

Our 60-foot steel baggage car costs only 70 per cent as much as mail car, and weighs only about 90,000 pounds, maintenance being much less than mail car. Passenger coaches cost about 10 per cent more than postal cars, whilst sleeping cars cost twice as much. The latter cars, however, are furnished without cost to the railroads, and the cost to the railroads for the average passenger car, including the sleepers, which cost them nothing, would be 20 per cent less than the cost of the 60-foot mail car. Coaches weigh somewhat less than mail cars, but sleepers weigh more, the average weight of all cars in passenger service being about the same as the average for mail service.

No such expense for passenger service, as trains are switched in stations only a short time before departure.

Similar liability is incurred for passengers, with the important distinction that the fares paid reimburse the railroads for liability assumed.

No such liability, and average speed in passenger service slower than mail trains.

Passengers load and unload themselves, although accommodations must be provided in stations.

Mr. ROWAN. Twenty-five cents a car mile. The same tariff provides a rate of 25 cents a car mile for empty cars—privately owned cars that are to be transported from one point to another in order to take a load or to go from one road to another.

* * * * *

Mr. ROWAN. The point I wanted to bring out is the fact that this is an exceptional rate and tariff reads in this manner: When unaccompanied by parties, or accompanied by parties of less than 10 persons, in which latter case tickets sold at regular first-class rates must be held by each person, the rate from 1 to 499 miles, 25 cents a mile; from 500 miles to 624 miles, \$124; 625 miles and over, 20 cents a mile; a minimum charge of \$15, which, after June 1, 1914, will be \$25, and the rate will be 30 cents per car mile instead of 25 cents, as at present.

The CHAIRMAN. That is an order from the Interstate Commerce Commission?

Mr. ROWAN. Yes, sir; it is a regularly published tariff.

Mr. LLOYD. Is it true that in the case of a privately owned car being transported from one place to another in order that it may be used at some other point, you charge 25 cents per mile for its transit?

Mr. ROWAN. I am not thoroughly familiar with that.

Mr. LLOYD. Do any of the rest of you know whether that is the rule or not?

Mr. PRABODY. That is the rule on the Santa Fe. We move empty cars for private parties at 25 cents a mile.

Mr. ROWAN. Unoccupied cars, passenger or baggage cars, not in service, owned by individuals, theatrical companies, amusement or advertising companies, when moved empty, when in charge of porter or other attendants will be charged for at the rate of 25 cents per mile per car, with a minimum charge of \$25 per car, plus one adult individual fare for each porter or attendant. This charge will apply whether or not the cars move in service in the first direction. After June 1, this rate will be 30 cents.

The CHAIRMAN. What is the date of that order?

Mr. ROWAN. That will be effective June 1.

The CHAIRMAN. What is the designation of the order?

Mr. ROWAN. It is a tariff and it will be a supplement to New York Central Tariff No. 1.

The CHAIRMAN. And goes into effect on June 1?

Mr. ROWAN. Yes. I. C. C. No. 817. The rate in effect to-day is 25 cents per car, and new rate 30 cents per car mile, and the minimum charge of \$15 will be \$25 after June 1.

Senator WEEKS. That means that the rate would obtain in each direction?

Mr. ROWAN. In each direction; yes, sir.

Senator WEEKS. And if the car made a round trip the rate would be doubled?

Mr. ROWAN. It will be doubled; yes, sir.

CHAPTER

COMPARISONS WITH T

The statistics of the Interstate permit of a separation of the reasons riding in Pullman cars. Nings from the Pullman service c pays for transportation in the s road company for the mere transp Co. for the special services. We ments to the Pullman Co. One railroad company ought to receive hauling Pullman coaches than for because the Pullman coaches are steel sleeping car weighs 73 tons, steel postal car. Since the passe Pullman coaches are not kept miles, we are unable to state the Pullman car.

In its report to the Interstate Co. shows that the average number *day* was 12 for the year 1913. T in a communication to this comm the average number of passengers ever, it would seem to be necessary passengers who get on a car during that car during its entire trip. V fare is paid to the railroad company cars. But for a very rough approxing 12 passengers at 2 cents a mile company of 24 cents per car per relied upon, the exact return to modified by the nature of the co Pullman Co. Some companies p while others share in the Pullman man Co. repairs its cars, thus reli care of these cars, must be taken i that the Pullman fare is generally a As the Pullman Co. in 1913 earne to the report of the Interstate (indicate a railroad earning from j cents per car mile. Accordingly is railroad and Pullman Co. togeth taken as the railroad earning), or a use of a Pullman car 1 mile. Howe car mile earning be too high or to what the mail rate for a car mile railroad service should be studied according to the services performe

CHAPTER IX.

ANALYSIS OF THE BILL PREPARED BY THE JOINT COMMITTEE

The chief feature of the bill is that the basis of payment is the train space occupied by the mails and not the weight of the mails carried. The question of space as a basis for mail pay was discussed in a previous chapter (p. 63-64). A second feature of the bill, which it is believed gives a practical turn to the space idea, is the determination of standard units of 60, 30, 15, 7, and 3 feet of space. This idea was developed at one of the hearings in a colloquy between members of the joint committee, a railroad representative, and an employee of the Post Office Department. (See Hearings, pp. 597-598.)

The purpose of defining standard units is to overcome the uncertainties that would follow an attempt to measure during a statistical period the exact number of feet occupied by the mails. With the unit defined it becomes a simple matter for the Postmaster General to say to a railroad what and how many units of space are required on a given line. The price per unit being stated in the law, there is no ground for dispute, the unit being paid for whether it is fully utilized or not. On the other hand, if the railway company can not furnish the unit asked for, but furnishes a larger unit, it would receive no pay for the excess space furnished. It will be seen, therefore, that the rates hereinafter recommended are to be judged with the understanding that the major portion, but not quite all, of the space actually run, loaded and empty, will be paid for.

The unit plan, however, is not without its own difficulties. The standard full-sized mail car is to be 60 feet in length, inside measurement. A number of 70-foot cars have been built. If the building of 70-foot cars is justified from the standpoint of economy in transportation, the unit plan would tend to discourage such economy in the future. But we are informed that on most roads 60 feet is accepted as a reasonable standard for passenger-train cars. Again, we find that the railroads now have in use many apartment cars of odd sizes, such as 18, 20, and 25 feet. The size of apartments is not easily changed because of the location of windows, doors, and interior equipment. In the bill the railroads are given the option of standardizing the equipment or of accepting a rate of pay proportionate to the length of the car requested by the Postmaster General.

ROUND TRIP AUTHORIZATIONS PROVIDED FOR.

The bill provides that payments for full-sized post-office cars, apartments, and storage cars shall be made for the round trip of the car. There is no question about the justice of this in the case of the specially equipped post-office cars and apartments. This is in effect what is done in the passenger service. Although a passenger pays for only the number of miles he actually rides, his fare is fixed upon a

the statistics of cost before the committee. The committee's bill we think, will produce an average rate of approximately 24.69 cents per 60-foot-car mile, before deductions for land-grant routes are made. The exact payment per car mile will depend upon what authorizations the department will make for the various units.

This rate, however, as has been explained above, varies for the different lengths of haul, and it has also been made to vary by making the rate for fractions of cars relatively higher than for full cars. The schedule of the rates is given below:

Class of service.	Terminal charge, irrespective of distance.		Line charge per unit mile run.
	Round trip.	Single trip.	
60-foot R. P. O. car.....	\$8.50	\$4.25	Crn.
Storage cars.....	8.50	4.25	St.
80-foot apartment.....	5.50	2.75	Ap.
15-foot apartment.....	4.00	2.00	Ap.
Closed pouch:			
7 feet.....	1.00	.50	P.
3 feet.....	.50	.25	P.

The table presented in Chapter I, page 19, shows the estimated relative importance of the various classes of service and of the total terminal as compared with the total line compensation. It will be noted that the total terminal compensation is 11.65 per cent of the total compensation.

For the R. P. O. and storage cars the terminal expense is relatively less important than for the apartment cars and closed-pouch service, because the average length of haul is less in the case of the latter. The average line rate is 21.82 cents. The line rate is less for 60 feet of space in the full R. P. O. service than for the same amount of space in the apartments. This appealed to us as fair on the wholesale and retail principle. When fractions of cars are authorized by the Post Office Department, there is certain to be some waste of space, because it occasionally happens that a company must run an additional car to supply an apartment. On the other hand, it will happen that the department will utilize space for which the company has no other use. The testimony was not conclusive on this point, but we were further influenced by the consideration that the apartment cars will predominate on the railways of lighter traffic.

The following table shows the line rate prorated to a 60-foot basis for each of the units and indicates how the line rate increases with the decline in the size of the unit. The same result, but on a different principle, is to be observed in the construction of the terminal charge, except that the closed pouch is on a lower basis than the apartments for 60 feet of space. This is explained by the fact that no extra switching is occasioned by closed-pouch service.

1 Average distances (especially in case of 60-foot R. P. O.'s) are too long for R. P. O. routes and not on the operating run of the cars. If the 60-foot rate 22.41 would be changed to 22.06 cents.

However, there is a considerable difference switching and mail car switching. A mail car three empty freight cars, and mail cars must for the advance distribution, singly, while freight handled in cuts consisting of a number of cars actual number of minutes required in switch show that the \$1.25 is too low rather than too

A study of 13 single-trip full R. P. O. cars Baltimore & Ohio, made for us by Mr. J. C. McClellan, of mail traffic of that railroad, indicates that at our terminal allowances are too low. After noting the number of minutes during which switch engines were used on these cars, and allowing for such time at \$4 per switch engine hour, adding the actual cost of cleaning and the cost of lighting the cars while clerks are making the

the average per single trip amounted to \$4.58, as against the \$4.00 which we have allowed for the 60-foot car. The six movements at \$1.25 amount to \$7.50. To this we add a cleaning charge for the round trip of \$1, making \$8.50 in all. In the case of the 30-foot apartment, the special mail switchings again are taken as two for the round trip, but the mail, since it occupies but half the car, should be charged with only one-half of the other four switchings. The total four switchings at the rate of \$1.25 amount to \$5, to which is added one-half the cleaning charge, making a total of \$5.50. By the same process the 15-foot apartment terminal charge is made \$2.75.

The storage car is given the same rate as the R. P. O. car. This is an arbitrary, as we were unable to make a satisfactory appraisal of the differences in the two classes of cars. The storage car with its load will weigh less than the R. P. O., but it costs less to build and equip, and it is not so well lighted. On the other hand, there is a greater tonnage of mail matter carried in the storage car, and this requires more labor for loading and unloading per car.

The loading and unloading of mails has been included in the line charge and not in the terminal charge, since, in making a rate on the car basis, it must be remembered that mail is not merely loaded and unloaded at its beginning and end of the runs, but also continuously along the line. The amount of loading and unloading is thus not independent of the distance. From this point of view any particular railroad station is a terminal for those cars only which originate or terminate at that point, while for all cars passing through such station is regarded as incidental to the line run. This view is consistent with the car-mile unit of payment. To be sure, loading and unloading is not strictly proportional to the distance run, and the more accurate method would be to have a separate factor in the rate based on the total weight loaded or unloaded in any car run, but this would involve a weight-space basis and would complicate the problem more than is necessary for substantial justice.

GOVERNMENT OWN

The American people have given them the highest regard for all the branches. There has been a great extent of belief in the infallibility of the various bureaus in the administrative system. This is probably due to the faith in the efficiency of the various reports made by the various bureaus, and the further fact that the President has a personal touch with the heads of the various bureaus. For these reasons the confidence of the soundness of their predictions before venturing to make a result in shaking the confidence, or integrity, or intelligence of Government.

In 1887 the then Postmaster General made his report regarding R. P. O. cars, and the idea that the Government should pay a million and a half dollars per year for the operation of the R. P. O. cars, and the present system of paying the Post Office for maintaining, and hauling the cars.

Such a statement unexplained the minds of the individuals who were in suspicion as to the intelligence of the Government, the legislative and administrative.

Eliminating for the present the undesirability of Government cars, and deal specifically with the question of the Post Office and try to ascertain and demonstrate the statement made by Mr. Vilas.

As has been previously stated, the present system is paid for in proportion to the weight of the mail carried by the post-office cars. A rate based on the weight of the mail in cars loaded in the early days of the Post Office service performed by the railroads. As business methods increased the cost of mail and delivery. Although in former times to have the mail hauled on the railroads, and distributed at junction points or at the end of the line, rapid service made this entire system for a more rapid service grew up. Practically a post office on wheels, and the clerks are enabled to distribute the mail.

it as to the different branch roads upon which it is to go, but also distributing city mail by carrier routes so that there shall be no delay whatever at junction points nor in cities where the mail is to be delivered.

The performance of such service on board the train requires the equipment of cars with a special apparatus, particularly racks for holding mail bags and distribution cases for the sorting of letters. The necessary result of this requirement is that instead of containing 8 to 12 tons of mail, which an ordinary car will hold, the amount of mail actually carried in a railway post-office car averages only 2.26 tons. In other words, the Post Office Department not only requires the transportation of mail but requires the transportation of largely empty cars used for the sorting of mails en route.

The general assumption is that when the Government pays the railroads for the transportation of a certain quantity of mail ascertained by weight, the only additional amount that should be paid for the use of a special car would be one based upon the extra value of the car itself. The fact is, however, that the extra cost imposed upon the railroad company is not due so much to the extra cost of the car as to the extra cost of hauling the additional car space.

An illustration based upon transportation more familiar to the average citizen will indicate the difference in service rendered in transporting mail in cars loaded to their capacity and in cars loaded to one-fourth of their capacity.

Let us suppose that a farmer is shipping his apples to a distant market and is paying the regular ton rate for car lots. Then, owing to circumstances which make it extremely important that immediate transportation of the apples be secured, the producer desires to save the time in which the apples are in transit and asks the railroad company to supply cars in which the apples can be sorted while on the road. The space required in the cars for sorting the apples into different grades makes it impossible to carry more than one-fourth of the quantity theretofore conveyed. Necessarily, the railroad must have increased compensation for providing and hauling the extra cars necessary in order to convey the apples in the small lots made necessary by sorting en route. In the illustration thus presented, the producer would not be merely paying for extra car space but for the hauling of that space over the railroad.

In the case of the transportation of mail in specially equipped railroad post-office cars, the additional payment is not merely for the use of the car space, but for the hauling of the space over the railroads. If the Government itself should own the cars, it would have no more right to ask the railroads to haul them with only 2 or 3 tons of mail therein at rates fixed for the transportation of mail in bulk than the apple producer would have to require the railroad company to haul sorting cars owned by him at the ton rate fixed for the transportation of apples in bulk.

WOULD INCREASE EXPENSE.

Our study of the subject has convinced us that Government ownership of post-office cars is entirely impracticable and would be much more expensive to the Government than the present system of compensation. At present the railroad companies own the cars and pay all the expense of heating, lighting, repairing, painting, cleaning,

inspecting, furnishing id cars, which would be set be compelled to employment of defects which cleaners and arrange for shops and employ expert person of business experience the comparatively Service would cost the railroads. Nor do we in consideration, will not haul such Government for the service rendered.

In our investigation of statistics as definite as Interstate Commerce Commission the railroads have given procure definite data. demonstrate the absolute ment could profitably or

According to tariffs filed we find that on one-way including advertising, dental, exhibition, industrial car mile for occupied cars occupied cars from 25 to Coast Line, Baltimore & M. S. (New York Central Hudson River Railroad, Pennsylvania Railroad, Pacific, and Union Pacific Line, Seaboard Air Line, their unoccupied cars 25

While the reasonable upon by the Interstate effort at reduction has been able. The Interstate Commission question the reasonable

Therefore it may be a R. P. O. cars and called upon senger trains with such rate the rate would be in the probably the interest on the cost of general and running revenue ment itself paid for the

Reports received by the the largest mileage of miles annum of \$1,319.87 for depreciation for each R. costs about \$12,000, the rate be \$720. The average revenue annum. The total of this is \$2,375.78. Dividing this will be seen that the ex

would properly be deducted from the 25-cent haulage rate mentioned above.

In other words, if the Interstate Commerce Commission should determine that the railroads were entitled to receive the same haulage rates for Government owned, maintained, and repaired R. P. O. cars as now charged by some roads as between themselves and representing a minimum single-trip charge as between the railroads and the public on unoccupied passenger cars, and if some person or persons should present the Government with a complete line of \$12,000 R. P. O. cars and should pay for the expense of general and running repairs and for depreciation, which according to the above estimates would amount to 2.25 cents per car mile, and the Interstate Commerce Commission should make that deduction from the 25-cent car-mile haulage rate allowed the railroads for hauling the Government-owned cars, it would cost the Government, and the railroads would receive, 22.75 cents per car mile for hauling said cars. But if the Government bought and paid \$12,000 for every 60-foot steel R. P. O. car and it cost the Government no more than it does the railroads for general and running repairs, which supposition is absurd on its face, then the deduction that would be made on the car-mile revenue basis that might be allowed the railroads by the Interstate Commerce Commission would only be the difference between the rate of interest paid by the Government, say 3 per cent, and the rate of interest paid by the railroads, say 6 per cent, on borrowed money applied to the car-mile basis, or a reduction of 3.41 mills, plus a 5-mill car-mile reduction for maximum annual depreciation per car. This would make over 24 cents instead of the 22.75 cents that the Government would probably have to pay the railroads according to the above line of reasoning.

Yet to-day, under present methods, the railroads are receiving a total of only 21.579 cents per car-mile for operating a 60-foot R. P. O. car carrying the average load. This statement is based on the following premises and deductions:

In House Document No. 105, page 196, it is shown that the mail routes carrying over 5,000 pounds a day have 423,666,000 car-foot miles of full R. P. O. service out of a total of 431,000,000, or 98.2 per cent of the entire full R. P. O. car service. On page 37 of the same document it will be found that the routes carrying 5,000 pounds a day or more receive R. P. O. pay to the amount of \$4,631,000 out of a total of \$4,697,000, or 98.6 per cent of the total. Therefore, the routes carrying 5,000 pounds or more daily embrace over 98 per cent of the car miles and over 98 per cent of the compensation for full R. P. O. cars.

Turning to page 852 of the hearings, the Post Office Department statistics show that the routes carrying over 5,000 pounds a day receive for transportation pay (weight pay) \$33,845,070.62. The same table shows that the same routes carried 474,816,564 tons 1 mile. Dividing the latter into the former, we obtain an average rate of 7.128 cents per ton per mile. On page 1279 of the hearings there is a statement from the Post Office Department giving a density of load of 2.26 tons per car. Multiplying 7.128 cents by 2.26 tons, we obtain a product of 16.109 cents as representing the average pay to the railroad company from the weight of mail contained in the R. P. O. car. But in addition to this, the railroad company receives a space rate which, for a 60-foot car, is stated in the law as \$40 per mile of route

Under Government ownership and operation there would be over 3,000,000 governmental employees.

Taking into consideration the fact that in the last 10 presidential elections the President has been elected by a plurality varying from 7,000 plus to a little over 2,500,000, the thought naturally arises that 3,000,000 governmental employees could absolutely control the Government under our political machinery, the tendency being more pay, less service in governmental employment, resulting in resistless efforts on the part of outside labor to secure Government employment because less onerous and more remunerative, with accumulative dissatisfaction and irritation in all private enterprise.

Two years ago in the parcel-post study it developed that the express companies had over 79,000 employees receiving an average wage scale of less than \$50 per month, while the postal employee performing a similar service received an average of \$93 per month, demonstrating that under Government ownership and operation of express companies the wage scale would cost the Government, conservatively speaking, \$30,000,000 more for operation in labor payments than it did the express companies.

Governmental efficiency and economy of operation can never equal that of private enterprise, and the whole desiderata of Government should be equal legal opportunity for all and limitation on individual liberty only in the prohibition of preying on the personal or property rights of others. Our present drift to departmental rule and regulation, instead of a government by law, which is the greatest menace to the future of our country, would, in our opinion, be greatly accentuated by governmental ownership.

of 328 miles, whereas a special weighing demonstrated that the average payment was, in fact, 2.75 cents per pound, averaging only 12.5 cents per ton-mile, with an average haul of 438 miles. Commenting upon these statistics, Congressman Moody said:

In other words, we were not paying one-third as much as the Post Office Department had led the people of the country to believe we had been paying.

Very similar was the experience of a commission appointed in 1911 to investigate the subject of postage on second-class mail matter, of which commission Justice Hughes, of the Supreme Court, was chairman. Repeatedly the statistics submitted by the Post Office Department were shown to be erroneous, and the department changed its figures when compelled to do so by the demonstration of their inaccuracy. So numerous and so glaring were the errors that the commission commented upon some of them as follows:

It seems hardly worth while to include subsidiary tables from which these results are taken or to criticize the details, as the commission has little confidence in their accuracy.

The Hughes Commission also said in its report, in commenting upon the effort of the Post Office Department to present statistics showing a proper apportionment of general post-office expenses to the different classes of mail:

In view of the errors and inconsistencies in which the returns of the post office abound (we do not extend this report to review them), our examination has convinced us that the computation is not sufficiently accurate to base an apportionment of the cost of the general post-office service.

Having before it this record of unreliability of departmental statistics, this committee could not, with due regard to the fulfillment of its duties, accept the departmental statistics as accurate and reliable unless independent investigation and checking from other sources confirmed the figures the department had given.

The inadequacy of the statistics is no more subject to criticism, however, than the seeming lack of frankness with which the department prepared statistics for submission to Congress and to this and other commissions.

A number of errors have been found in the statistics submitted by the Post Office Department relative to the service properly chargeable against the Government for railway mail transportation. It is singular that in most instances these figures have erred on the side of indicating the possibility or desirability of a lower compensation for carrying mail. Usually when the Post Office Department has been compelled to revise its figures, that revision has resulted in a showing more favorable to the claims of the railroads. In any fair effort to present statistics, it would be reasonable to expect that errors would occur on one side as frequently as on the other.

DEPARTMENTAL VACILLATION.

One of the first instances of vacillation in figures submitted to the joint committee by the department was that in regard to over-pay of the railroads. In Document No. 105, Postmaster General Hitchcock recommended for enactment by Congress a bill incorporating

Commenting upon this statement, Second Assistant Postmaster General Stewart said, in his brief transmitted on January 16, 1914:

Unfortunately for the accuracy of the matter the letter of Postmaster General Hitchcock transmitting Document No. 105 differed from the letter of the Second Assistant Postmaster General in stating that "The committee estimates that through a readjustment of railway mail pay on the basis of cost with 6 per cent profit a saving to the Government could be made of \$9,000,000."

Mr. Stewart then goes on to say in his brief that this \$9,000,000 saving was intended to apply to service on railroads which represented 175,922 miles of route out of a total of 220,730 miles, and that the same rate of saving applied to all routes would show a total saving of \$10,531,792. (Hearings, p. 989.)

It is unnecessary for us to enter into a discussion of the question whether Postmaster General Hitchcock misconstrued the language of the committee of which his second assistant was chairman. If the Postmaster General, with all his supposed knowledge of postal affairs, misconstrues the carefully prepared language of a report signed by his second assistant in such a manner as to involve a difference of a million and a half dollars, what basis is there for the assumption that the ordinary citizen can understand what the second assistant meant by the language he employs?

It is also worthy of note that the subject of this \$9,000,000 saving was discussed with Mr. Stewart at the first hearing conducted by the committee, January 28, 1913, and was frequently referred to thereafter but the second assistant made no mention of this discrepancy of a million and a half dollars until January 16, 1914, practically a year later. Whether the discrepancy was not discovered or whether, having been discovered, it was carefully evaded, there is equal demonstration of the necessity for the utmost care in accepting department statistics.

NUMEROUS INCONSISTENCIES DISCLOSED.

Other vacillations in statistics will now be noted:

One of the most important factors in the consideration of the cost of transportation properly chargeable against the mail service is the relative amount of space the mail service uses. The original statement of the department in Document No. 105 was that the car-foot miles of the mail service were 7.179 per cent of the total passenger-train car-foot miles. In the brief filed on January 16, 1913, this percentage was changed to 7.09 (Hearings, p. 1008), and on April 3, 1914, the percentage was changed to 7.40 per cent on the basis of the department's third plan (Hearings, p. 1498).

In a table compiled from statistics in House Document 105 the statement was made that the express revenues per car-foot mile were 3.865 mills (Hearings, p. 1008); this was later changed in a statement under date of March 24, 1914, to 3.56278 mills per car-foot mile (Hearings, p. 1279, footnote), and in a letter dated May 28, 1914, it was again changed to 3.7745.

In a hearing before the committee (not printed) the department estimated the storage car miles as approximately 38,000,000 per annum, but on June 29, 1914, upon the request of our committee

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BETTER ACCOUNTING SYSTEM NEEDED.

In view of the amazing number and incredible character of erroneous statistics supplied to this and previous commissions, we are impressed with the idea that the department is in need of the services of some man who is a master of the preparation and submission of statistics, thus enabling the department to comply with reasonable requests Congress may make for data regarding the Postal Service.

The Post Office Department is one of the largest business enterprises in the world. Attainment of efficiency by adoption of the most modern business methods should be one of its fundamental principles. It expends now over \$300,000,000 per year of the money of the people of this country. At the average annual rate of increase for the last 10 years the Post Office Department will within 20 years receive and expend over a billion dollars annually. It is the largest single employer and in its operation reaches into more remote sections of the country than any other institution. With any reasonable degree of effort, the department should be able to give accurate statistics regarding the extent of its activities, the cost of the service, and the revenue therefrom. The fact is, on the contrary, that the department has not been and is not now so conducted as to be able to do this, although, as already shown, repeated attention has been called to the defects in the accounting system.

The necessity of going to outside sources for ultimate verification and also the labor of testing the accuracy of departmental statistics has very greatly delayed the work of this committee. While it is an injury to the pride of an American citizen to know that the most important of our governmental institutions is so utterly lacking in knowledge of its own business affairs, as this record has disclosed, we believe it is a duty we owe to the country, to Congress, and to ourselves to state these facts in order that others may not be misled by assuming that departmental statistics are reliable.

We also feel impelled to suggest that Congress should exercise a more direct supervision over this important branch of governmental administration to the end that Congress shall not be dependent upon the inaccurate and sometimes biased statements of fact submitted by the department.

This exposé of the inadequacy of departmental statistics and the vacillation and inconsistency of the department is not prompted by partisan feeling. The record has been made in the administrations of two political parties. The presentation of this record is prompted solely by the desire to impress upon Congress and upon the American people the need of halting the present tendency to delegate all power to an administrative department.

As a Nation we have been prone to concede the assumed infallibility of individuals who represent the United States Government. We have drifted rapidly and far in the direction of government by men rather than government by law. Only by a frank, fearless, and complete presentation of facts can we hope to warn of the dangers ahead.

CHAPTER

DELEGATION OF DISC

It will be observed that the bill for enactment leaves as little as officers of the Post Office Department importance.

The Constitution of the United making body. The people of the government and adopted the clear language their desire that under which they were to be governed not merely a matter of choice with it is required to perform.

The enactment of any law which ment the power to adopt rules and delegation of legislative power. A fulfillment of its obligations to the gress, so far as practicable, to enact amount of discretionary power to departments, so that the measure and responsibilities will be clearly of our statutes, thus not subjecting whims or prejudices of men who hutions in the administration of law.

THE DIVIS

The present law governing railway terms, fixing maximum rates that a daily weights ascertained in 90-days great many years this statute was in method of computing the average, but its interpretation of the law with the railway mail pay of \$5,000,000 per

It is not our purpose to enter into controversy over that much-discussed to say that in our opinion no statute books couched in such language by a change of interpretation to increase in the rate of mail compensation change its interpretation so as to railroads \$5,000,000, another administration by effecting a corresponding department has the power virtual that extent.

Although the subtleties of legal lish that the exercise of this power

power, the incontrovertible fact remains that the department exercised authority which changed the compensation \$5,000,000 a year. We believe the statutes should be so drawn that there can be no uncertainty of this kind, and no such latitude for change of statute by interpretation.

We believe it pertinent and desirable in this connection to direct the attention of Congress to the persistent efforts of the Post Office Department to secure larger discretionary power which it could use in an arbitrary manner. One of the indisputable instances of this kind was the suggestion in what is known as the Hitchcock plan submitted to Congress in Document 105, that in fixing rates of compensation for mail transportation the department should be given authority to ascertain the total cost of all railway operation and taxes, and make the separation of such cost as between freight and passenger train service, and then a secondary separation of the passenger-service cost as between passengers, express, and mail, the cost apportioned to the mail service being the basis for the fixing of the rates.

A more astounding proposal could hardly have been made. If given the power to make the apportionment of expenses of freight and passenger train services, and then a secondary apportionment of the cost as between passengers, express, and mail, the department would have power to change the basis of rates to a greater extent than was done in the case of the divisor order. By the adoption of an arbitrary rule for which it would be accountable to no one, the department could change the compensation of the railroads several million dollars a year.

As an illustration of how such discretionary power might be exercised, if conferred, we may cite the recommendation of Postmaster General Hitchcock that the rates of compensation for mail transportation be based upon the actual cost of operation and taxes, with 6 per cent thereof as a profit. His recommendation made no allowance for an adequate return to cover interest on indebtedness or return on capital employed. We are not aware of any other authority occupying a position of trust and responsibility who has ever fathered the suggestion that a business enterprise can be successfully conducted upon such principles. The very fact that such a recommendation was made by a Postmaster General and six of his subordinates is sufficient evidence that it would be worse than folly to delegate large discretionary power to a department likely to be conducted by men entertaining such opinions.

Although advocacy of the Hitchcock plan has been abandoned by the department, we make this reference to its fundamental features because it illustrates the dangers incident to congressional abdication of legislative functions and the delegation of such functions to the administrative branch of Government.

BLUE TAG ORDER.

Congress had another very apt illustration of the manner in which discretionary power is likely to be exercised, in the famous "blue tag" order of the Post Office Department. Under that order, the department caused some periodicals to be removed from the mail train service and transported by freight, although rival magazines.

which bill the Postmaster General recommended for enactment. One section of this bill may be cited for illustration. It reads as follows:

The Postmaster General shall from time to time request information from the Interstate Commerce Commission as to the revenue received by railroad companies from express companies for services rendered in the transportation of express matter, and may, in his discretion, arrange for the transportation of mail matter other than of the first class at rates not exceeding those so ascertained and reported to him, and it shall be the duty of the railroad companies to carry such mail matter at such rates fixed by the Postmaster General.

A reading of this paragraph shows that the department considers itself better fitted than the Interstate Commerce Commission to fix transportation rates. That section requires the Interstate Commerce Commission to inform the Postmaster General what revenues are received by railroad companies for express service, and then authorizes the Postmaster General to fix rates for the transportation of matter other than first class at not exceeding those so ascertained, and makes it the "duty of railroad companies to carry such mail matter at such rates *fixed by the Postmaster General.*"

This provision would apply to matter of the second, third, and fourth classes, namely, newspapers, magazines, and other periodicals, printed matter, parcel-post matter, and also to free matter. All these classes of mail, constituting approximately 90 per cent of the total weight of all mail matter, the railroads would be required to carry at rates which the Postmaster General could fix as low as he pleased, but not exceeding the average express rates.

No investigation would be required, no hearing need be granted: the railroads could have no opportunity for defense, the reasonableness of rates could not be attacked, there could be no appeal—the mere ipse dixit of the Postmaster General would determine the rates the railroads should receive for transporting all second, third, and fourth class, and free mail matter.

The greed for power manifested by this recommendation is surpassed only by the concentrated egotism which prompted the belief that the department could rightly exercise such power if granted.

Possessed of the power the Post Office Department has requested in the various measures it has proposed and advocated, the Postmaster General might well exclaim in the language of a famous European monarch, "The state! I am the state!"

BUREAUCRACY GONE MAD.

Unless confronted by the record of its recommendations, we would be loath to believe that any administrative department could presume to ask such a delegation of power from an intelligent, self-respecting, legislative body imbued with a fair appreciation of its own functions.

In view of the evidence, which is submitted on pages 111-116 of this report, showing the inability of the department to procure and present reliable statistics regarding its own operations, it is difficult to conceive how the department could imagine itself competent to make an apportionment of expenses between freight and passenger train service and among passengers, express, and mail.

Equally difficult is it to comprehend by what course of reasoning the department could bring itself to believe that Congress might enact a law which required the railroads to carry mail and then bestowed upon the Postmaster General the power to fix the rates.

Verily, this is bureaucracy gone mad.

compensation is largely problematical for the reason that it can not be known in advance exactly what space the Post Office Department will authorize for the transportation of mail. We firmly believe, however, on the showing made in the Lorenz table, submitted on page 19, Chapter I, of this report, that the enactment and operation of our suggested bill will not result in increased postal expenditure of more than \$3,000,000 over the actual appropriations carried in the last Post Office appropriation bill for railway-mail pay, including inland transportation by railroads, postal pay for freight or expressage and railway post-office car service.

That there should be an increase in railway-mail pay need not be surprising; in fact, it must be expected. The volume of postal revenue increased at the average rate of about 7 per cent per annum or an average of about \$13,000,000 a year during the 10-year period from 1903 to 1913. This necessarily means a corresponding increase in the volume of mail. No reasonable man can expect that the Government can increase its postal revenues at an average rate of \$13,000,000 per year without increasing its expenses in practically all departments of the service, though perhaps at a smaller ratio. In this connection it is pertinent to remark that although the postal revenues doubled in that 10-year period railway-mail compensation increased only 20 per cent.

We submit as an appendix herewith an itemized statement of expenditures of the committee aggregating \$6,560.50 up to August 1, 1914. On August 24, 1912, Congress appropriated the sum of \$25,000 for the use of our committee. We have on hand a balance, therefore, of \$18,439.50 still available out of which to defray such additional expense as may be incurred in working out a plan for mail pay to electric roads and in conducting the study of postage on second-class mail matter. The itemized statement will be found on pages 123 and 124.

The expenditures of this commission contain no items of expense on account of the members themselves. As heretofore explained, two members of the commission, the chairman, Hon. Jonathan Bourne, jr., and Hon. Harry A. Richardson, ceased to be members of the Senate on March 4, 1913. In pursuance of the act of Congress continuing the personnel of the commission, they have continued to serve without compensation and have paid their own expenses.

The expenditures above mentioned do not cover printing, which, under general laws, is paid for out of the general printing appropriation bills.

LIST OF VOUCHERS IN ORDER OF ISSUANCE.

1913.

Jan. 28-Feb. 17, stenographic services reporting hearings, Warren M. Mitchell	\$493.50
Mar. 27-Apr. 22, stenographic services reporting hearings, Warren M. Mitchell	547.50
Mar. 26, telephone, Mrs. H. G. Daley	2.45
Mar. 15-Apr. 1, clerical, Miss Blanch Austin	25.00
Apr. 1-Apr. 15, clerical, Miss Blanch Austin	32.50
Apr. 15-May 1, clerical, Miss Blanch Austin	25.00
Apr. 7-May 1, stenographic services, Mrs. F. E. Ramsay	80.00
May 1-May 16, stenographic services, F. E. Ramsay	50.00
May 16-May 31, stenographic services, F. E. Ramsay	50.00
June 1-June 30, stenographic services, F. E. Ramsay	100.00
July 1-July 15, stenographic services, F. E. Ramsay	50.00
July 10-July 31, services as secretary to the joint committee, Robert H. Turner	140.00
Aug. 6-Aug. 12, clerical services, Mr. J. J. H. Poole	25.00
Aug. 1-Aug. 31, services as secretary, Robert H. Turner	200.00
July 28-July 31, statistician, Mr. M. O. Lorenz	30.00
Aug. 1-Aug. 31, statistician, Mr. M. O. Lorenz	300.00
Sept. 22, stenographic services reporting hearings, Warren M. Mitchell	150.15
Aug. 25-Sept. 24, stenographic services, Miss J. M. George	100.00
Sept. 1-Sept. 30, statistician, M. O. Lorenz	300.00
Sept. 1-Sept. 30, services as secretary, Robert H. Turner	200.00
Oct. 1-Oct. 31, services as secretary, Robert H. Turner	200.00
Aug. 15-16, traveling expenses, Robert H. Turner to New York	18.35
Aug. 15-16, traveling expenses, M. O. Lorenz to New York	18.24
Nov. 1-Nov. 30, services as secretary, Robert H. Turner	200.00
Nov. 1-Nov. 15, stenographic services, Janie M. George	25.00
Apr. 16-Dec. 4, stationery, Charles N. Richards	7.90
Dec. 1-Dec. 31, services as secretary, Robert H. Turner	200.00

1914.

Jan. 20-Feb. 3, stenographic services reporting hearings, Warren M. Mitchell	\$329.06
Dec. 27, 1913-Feb. 27, stationery, Charles N. Richards	6.18
Jan. 1-Jan. 31, services as secretary, Robert H. Turner	200.00
Feb. 1-Feb. 28, services as secretary, Robert H. Turner	200.00
Feb. 19 and Mar. 7, Western Union (\$0.71 and \$0.48)	1.19
Feb. 26, stenographic services reporting hearings, Warren M. Mitchell	56.00
Mar. 1-Mar. 31, services as secretary, Robert H. Turner	200.00
Mar. 10-Apr. 10, clerical services, Thomas J. Lloyd	125.00
Mar. 16-Apr. 3, stenographic services reporting hearings, Warren M. Mitchell	577.85
Mar. 14-June 5, stationery, Charles N. Richards	5.55
Apr. 1-Apr. 30, services as secretary, Robert H. Turner	200.00
Apr. 10-May 10, clerical services, Thomas J. Lloyd	125.00
May 1-May 31, services as secretary, Robert H. Turner	200.00
May 21-May 23, statistical service, A. C. Devoe	8.50
May 21-June 13, stenographic service, Janie M. George	80.00
May 22-May 29, clerical service, I. C. Racoosin	28.00
May 22-May 27, clerical service, James H. Irwin	17.50
May 23-May 27, clerical service, Margaret P. Wilson	14.00
May 25-May 27, clerical service, Elizabeth B. Burt	10.50
June 2, Western Union, telegram	.40
June 1-June 30, services as secretary, Robert H. Turner	200.00
June 9-June 16, clerical service, I. C. Racoosin	24.00
June 15-June 30, stenographic service, Janie M. George	56.00
July 1-July 31, stenographic service, Janie M. George	104.00
July 1-July 31, services as secretary, Robert H. Turner	200.00
July 18, stationery, R. P. Andrews Paper Co.	2.80
July 8-July 31, stationery, Charles N. Richards	7.26
July 31, clerical service, Virginia Early	10.00

July 31, 1914.....\$6,560.50





make it necessary rapidly to withdraw these deposits. And yet without additional revenue that plainly might become necessary, and the time when it became necessary could not be controlled or determined by the convenience of the business of the country. It would have to be determined by the operations and necessities of the Treasury itself. Such risks are not necessary and ought not to be run. We can not too scrupulously or carefully safeguard a financial situation which is at best, while war continues in Europe, difficult and abnormal. Hesitation and delay are the worst forms of bad policy under such conditions.

And we ought not to borrow. We ought to resort to taxation, however we may regret the necessity of putting additional temporary burdens on our people. To sell bonds would be to make a most untimely and unjustifiable demand on the money market; untimely, because this is manifestly not the time to withdraw working capital from other uses to pay the Government's bills; unjustifiable, because unnecessary. The country is able to pay any just and reasonable taxes without distress. And to every other form of borrowing, whether for long periods or for short, there is the same objection. These are not the circumstances, this is at this particular moment and in this particular exigency not the market, to borrow large sums of money. What we are seeking is to ease and assist every financial transaction, not to add a single additional embarrassment to the situation. The people of this country are both intelligent and profoundly patriotic. They are ready to meet the present conditions in the right way and to support the Government with generous self-denial. They know and understand, and will be intolerant only of those who dodge responsibility or are not frank with them.

The occasion is not of our own making. We had no part in making it. But it is here. It affects us as directly and palpably almost as if we were participants in the circumstances which gave rise to it. We must accept the inevitable with calm judgment and unruffled spirits, like men accustomed to deal with the unexpected, habituated to take care of themselves, masters of their own affairs and their own fortunes. We shall pay the bill, though we did not deliberately incur it.

In order to meet every demand upon the Treasury without delay or peradventure and in order to keep the Treasury strong, unquestionably strong, and strong throughout the present anxieties, I respectfully urge that an additional revenue of \$100,000,000 be raised through internal taxes devised in your wisdom to meet the emergency. The only suggestion I take the liberty of making is that such sources of revenue be chosen as will begin to yield at once and yield with a certain and constant flow.

I can not close without expressing the confidence with which I approach a Congress, with regard to this or any other matter, which has shown so untiring a devotion to public duty, which has responded to the needs of the Nation throughout a long season despite inevitable fatigue and personal sacrifice, and so large a proportion of whose Members have devoted their whole time and energy to the business of the country.



**EMERGENCY APPROPRIATION FOR I
CONSULAR SERVICE.**

L E T T E R

FROM

THE SECRETARY OF

REQUESTING

**THAT CONGRESS MAKE AN EMERGENCY A
\$1,000,000 FOR THE USE OF THE DIPLOMAT
SERVICE.**

SEPTEMBER 4, 1914.—Referred to the Committee on Appropriations
printed.

**DEPARTMENT OF
Washington,**

The SPEAKER OF THE HOUSE OF REPRESENTATIVES

SIR: At the request of the nations engaged in hostilities existing in Europe and elsewhere, the Government of the United States has accepted the care of their interests as aliens and nationals. Throughout the British Empire, Russia, and American diplomatic and consular officers are charged with the care of German and Austrian interests; in Germany and Austria they must care for British and French interests; in Japan the interests of Japan, and in Japan the interests of the United States.

The temporary suspension of banking facilities and the inability of making transfer of funds by the usual means upon the Government of the United States, as a result of the duty of caring for the interests of the nationals of the existing circumstances, the duty of advancing the interests of the countries for the current expenses of diplomatic and consular officers of the countries of whose interests it has assumed the care and necessary relief of the nationals of those countries.

To some extent these conditions have been met by the provision of reciprocal advances of moneys to the credit of the representatives in the respective countries but

that this method is not, in all cases, practicable owing to the difficulty of making money available through direct transfers of credits.

Therefore, to meet many cases which are arising, it is requested that Congress provide a fund, against which drafts may be drawn by American diplomatic representatives or from which advances of funds may be made to foreign diplomatic representatives upon the understanding that reimbursements will be made at such time and in such manner as the Secretary of State may deem expedient.

The creation of this fund will not be in the nature of an expense to the Government of the United States but rather in the nature of an advance of money to meet drafts and cover outstanding balances until such time as banking facilities are restored and adjustments are made feasible, when it is expected that the amounts advanced from the appropriation will be reimbursed.

I have, therefore, to request that the Congress appropriate a sum of \$1,000,000, to be disbursed for the purpose indicated by and under the direction of the Secretary of State and that provision be made by which payments by foreign Governments may be credited to the appropriation and be made available for further expenditures of like nature as they may become necessary, and that all sums paid to the United States in reimbursement of the appropriation shall be paid into the Treasury of the United States.

I should greatly appreciate as early action as possible upon this request, since a number of applications for transfers and advances of funds have already been received.

I am, sir, your obedient servant,

W. J. BRYAN.

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VE TO MESSAGE RELATIVE TO H. R. 7967.

MESSAGE

FROM THE

PRESIDENT OF THE UNITED STATES,

RETURNING TO

THE HOUSE OF REPRESENTATIVES, WITHOUT APPROVAL, HOUSE
BILL 7967, ENTITLED "AN ACT TO AMEND THE ACT APPROVED
JUNE 25, 1910, AUTHORIZING A POSTAL SAVINGS SYSTEM."

SEPTEMBER 11, 1914.—Message and accompanying papers referred to the Committee
on the Post Office and Post Roads and ordered to be printed.

To the House of Representatives:

I return herewith House bill No. 7967, entitled "An act to amend the act approved June twenty-fifth, nineteen hundred and ten, authorizing a Postal Savings System," without my approval.

With most of the provisions of the bill I am in hearty accord. They are admirably conceived and the changes of law which they propose would undoubtedly be very beneficial to the postal savings system; but a portion of section 2 seeks to make a change in the Federal reserve act of last December which I venture to regard as unwise.

When the Federal reserve act was passed it was thought wise to make the inducements to State banks to enter the Federal reserve system as many and as strong as possible. It was, therefore, provided in that act that Government funds should be deposited only in banks which were members of the Federal reserve system. The principle of such a provision is sound and indisputable. The moneys under the control of the Government ought to be placed only in those banks which are most directly under the supervision and regulation of the Congress itself. It was recognized, also, that the scattering of Government deposits in small amounts among too large a number of banks would in time of stress be of decided disadvantage to the Federal reserve system, which seeks as much as possible to mobilize the financial resources of the country under one control. The bill

which I now return repeals that provision so far as it might apply to funds accumulated in the hands of the Government under the Postal Savings System. It is in this provision of the bill that I find myself unable to concur.

It is my clear conviction, very respectfully urged and submitted, that as a matter of principle as well as of policy we should strengthen and safeguard the new banking system very jealously with a view to the ultimate unification of the entire banking system of the country under the supervision of the Federal Reserve Board. It would, in my judgment, be a grave mistake to take away any of the benefits or advantages held out by the present law to member banks to enter the system, and take them away just as the system is about to be put into operation and the promises of the act of last December made good to the banks that have entered.

I am not insensible to the inconvenience which some banks might suffer if the postal savings funds were withdrawn at this particular time, though the law itself, of course, conveyed notice of that removal fully nine months ago. I am not sure that the Federal Reserve Board would not be justified, under the terms of the law as it now stands, in exercising a certain liberal discretion in determining the time and the rate at which deposits should be withdrawn from banks not within the system. But, assuming that there has not been notice enough and that the withdrawal would of necessity be rapid or immediate, I venture to suggest that the otherwise admirable bill which I now return might be amended, and might, because of the financial circumstances now temporarily existing, be very advantageously amended to extend for another 12 months the period within which banks not members of the Federal reserve system must surrender the deposits of the Government. May I take the liberty of suggesting that this be done? It would remove from this bill the only feature which seems to me incompatible with sound public policy.

WOODROW WILSON.

THE WHITE HOUSE, September 11, 1914.

[H. R. 7967. Sixty-third Congress of the United States of America; at the second session, begun and held at the city of Washington on Monday, the first day of December, one thousand nine hundred and thirteen.]

An Act to amend the Act approved June twenty-fifth, nineteen hundred and ten, authorizing a postal savings system.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That such part of section six of the Act approved June twenty-fifth, nineteen hundred and ten, authorizing a system of postal savings depositories, as reads "but no one shall be permitted to deposit more than \$100 in any one calendar month" is hereby amended to read as follows: "but the balance to the credit of any person, upon which interest is payable, shall not exceed \$500, exclusive of accumulated interest," and said Act is further amended so as to repeal the proviso in section seven thereof and insert in lieu of such proviso the following: "*Provided*, That the board of trustees may, in its discretion, and under such regulations as such board may promulgate, accept additional deposits not to exceed in the aggregate \$500 for each depositor, but upon which no interest shall be paid."

Sec. 2. That postal savings funds received under the provisions of this Act shall be deposited in solvent banks, whether organized under National or State laws, and whether member banks or not of a reserve bank created by the Federal reserve Act, approved December twenty-third, nineteen hundred and thirteen, being subject to National or State supervision and examination, and the sums deposited shall bear interest at the rate of not less than two and one-fourth per centum per annum, which

rate shall be uniform throughout the per centum of such funds shall be w the Treasurer of the United States, lawful money as a reserve. The bo security in public bonds or other as board may prescribe, approve, and d and prompt payment of such deposit savings depository offices in each city ited in banks located therein (subst of each such bank) willing to receive regulations made by authority there shall at no time exceed the amount c such bank. If no such bank exist i where such deposits are made will rec such funds shall be deposited under t to such locality. If no such bank in deposits on the terms prescribed, the of the board of trustees and shall be centum. Such funds may be withdr and all other postal savings funds, or s drawn from banks and savings depos depositors when required for that pur war or other exigency involving the c of trustees may invest all or any part fund of five per centum herein provid States. The board of trustees may in bonds which have been or may be is Act of June twenty-fifth, nineteen h from the deposits or investment of p ment of interest due to postal saving excess thereof, if any, shall be covere of the postal revenue: *Provided*, That shall be subject to disposition as pro *further*, That the board of trustees m savings investments and use the proce For the purposes of this Act the wor include the District of Columbia, th word "bank" shall be held to inclu banking business.

Vice President

I certify that this act originated in

authorities and confined in the Hudson County jail, they being considered important witnesses in the case involving the responsibility for the explosion in the harbor. The consul general of Norway in New York conferred with the local authorities regarding the matter and asked that the seamen be released, but the authorities refused this request, basing their refusal on certain provisions of the law of New Jersey which they represented authorized the detention of the men as witnesses. At the instance of the Norwegian Legation, the department brought the complaint of the seamen to the attention of the governor of New Jersey who in reply advised the department that it seemed plain to him that it was necessary to detain the men for the present in order that justice might be done in the serious matter of the explosion. Although the detention of the seamen appears to have been a rather harsh act, it seems clear that the authorities acted in good faith and with due observance of the forms of law in holding the men as witnesses.

On March 6, 1911, an order for the release of the sailors was issued by the Circuit Court of the United States for the District of New Jersey, in which habeas corpus proceedings had been instituted. It thus appears that the men were detained about a month, being held for this length of time as witnesses in default of furnishing bonds in the sum of \$500 each. It appears that the following treaty provision contained in Article VII of the treaty of amity and commerce concluded April 3, 1783, between the United States and Sweden, was invoked in behalf of the seamen:

All and every the subjects and inhabitants of the Kingdom of Sweden, as well as those of the United States, shall be permitted to navigate with their vessels, in all safety and freedom and without any regard to those to whom the merchandise and cargoes may belong, from any port whatever; * * *

The Norwegian Government has asked this Government to pay an indemnity of \$400 to each of the sailors and the sum of \$1,587.78, the amount spent for legal services in connection with the habeas corpus proceedings which were instituted to obtain the release of these men.

The department has informed the Norwegian Government to the effect that it can not admit liability on the part of this Government to pay an indemnity to the Norwegian Government in satisfaction of this claim; that it appears that the seamen of the *Ingrid*, although temporarily detained under the order of an inferior State tribunal, were promptly discharged on application to the appropriate department of this Government; and that the Department of State does not consider that there was any violation of the treaty rights which were asserted in their behalf by the Government of Norway. The Norwegian Government, however, has continued to press the claim. It takes the position that since a Federal court of this country has decided that treaty provisions between the United States and Norway stood in the way of the detention of the seamen the Government of the United States has become liable for the breach of such treaty provisions.

In view of all the facts and circumstances of this claim, and particularly in view of the fact that the seamen of the *Ingrid* unquestionably suffered considerable hardship as a result of their detention, the Secretary of State has the honor to recommend that the Congress be requested to make, as an act of grace and without reference to

concluded on April 3, 1783, between Sweden and the United States is revived also for Norway, and said article 7 prescribes:

All and every the subjects and inhabitants of the Kingdom of Sweden, as well as those of the United States, shall be permitted to navigate with their vessels in all safety and freedom from any port whatever. * * *

I think it can not be rightly said that Norwegian vessels are allowed to navigate in all safety and freedom from any American port whatever if it should be allowed to put their crews into jail in cases when the members of the crew are not suspected of having committed anything against the laws of the United States.

I am quite well aware that the *Ingrid* is so badly damaged by the explosion that she probably can not continue her voyage; but this circumstance can clearly not interfere with the question of principle whether the crews can be taken away from Norwegian ships and withheld in arrest only because their presence might be useful to authorities or private persons.

I venture to trust that your excellency may find it convenient to take this matter up, and I should feel greatly obliged to your excellency for kindly bringing orders to be issued to the effect that the three sailors from the *Ingrid* be released from the arrest without delay. I beg to add that two of the seamen are Norwegians and one is a Dane.

Inclosing a cut from a New York newspaper treating the case, and thanking you beforehand for what your excellency should be pleased to do in this matter, I avail myself of this opportunity to renew to your excellency the assurances of my highest consideration.

H. BRYN.

LEGATION OF NORWAY,
Northeast Harbor, Me., July 28, 1911.

His Excellency P. C. KNOX,
Secretary of State, etc.

SIR: Referring to former correspondence, latest your excellency's note of March 16, 1911, I have the honor, acting under instructions from my Government, to address you again in the matter of the three sailors from the Norwegian ship *Ingrid*, who were arrested on the 3d of February last by American authorities and held in prison as witnesses of the explosion at Communipaw Docks, and who were, after habeas corpus proceedings, released on the 6th of March last by decision of the United States circuit court at Trenton, which court held that the seamen's detention was in violation of existing treaty between Norway and the United States.

My Government, who has been made acquainted with the correspondence between this legation and the State Department as well as with the other documents regarding the case, has directed me to submit the matter to your excellency's kind consideration in order that the three sailors—Second Mate Trygve Anderson, Deck Boy Sigurd Nilsen, and young man Arthur Rasmussel—may obtain a compensation from the American Government for the detention inflicted upon them by the New Jersey authorities, and in order that the sailors' expenses for legal assistance during the habeas corpus proceedings may be refunded. This request is based upon the fact

LEGATION OF NORWAY,
Washington, D. C., December 29, 1911.

His Excellency Hon. P. C. KNOX,
Secretary of State, etc.

MR SECRETARY OF STATE: In a note to Mr. Aubert, dated September 23, 1911, the Acting Secretary of State has suggested that the question of indemnity growing out of the fact that three sailors from the Norwegian ship *Ingrid* had been arrested and imprisoned upon commitment issued by an officer of the Second Criminal Court of Jersey City on the 4th of February, 1911, in violation of the treaty of commerce existing between Norway and the United States, ought to be brought before the United States courts before resort could properly be had to the presentation of a diplomatic claim. In the same note the Acting Secretary of State has stated that the attorney general of the State of New Jersey had expressed the opinion that the members of the board of chosen freeholders of the county of Hudson are the persons responsible under the conditions presented in this case, and that the prosecutor of pleas of the county might be joined with them in a civil suit.

On this occasion I beg to point out that the illegal writ by which these sailors were committed to imprisonment was issued by an officer of the Second Criminal Court of Jersey City on the date of February 4, 1911, and even though other American authorities may be implied in the illegal proceedings in this matter, this circumstance can not obscure the fact that the officer of the criminal court who issued the unlawful order of imprisonment was under the obligation, when acting in his official capacity, to respect and observe the treaties of the United States. Copy of the commitment was annexed to Mr. Aubert's note to your excellency of July 28, 1911.

Furthermore, I beg to state that the three seamen, being destitute of means, and an unlawful arrest being considered in Norway as well as in the United States a matter of high importance, the Norwegian Government found itself under the necessity of guaranteeing the expenses involved in instituting habeas corpus proceedings before the United States Circuit Court for the District of New Jersey in order to obtain the release of the unlawfully-arrested seamen. The circuit court recognized that the imprisonment was in violation of the treaty and ordered the release of the seamen.

As regards the question of indemnity to the three seamen for the unlawful imprisonment inflicted upon them by the said criminal court, the advice to seek remedy in a civil suit before the courts of this country would not help them much, as they do not possess the necessary means to take such action. The seamen therefore consider this advice an equivalent to a refusal of justice.

In this connection I beg to state that if any action is to be taken against the second criminal court of Jersey City for its violation of the treaty it will evidently devolve upon the United States Government to take such action.

I furthermore venture to state that various messages transmitted to Congress show that it is in conformity with American practice that an American citizen who has been wronged by a foreign authority seeks redress through the American Government. Many instances might be cited in which the American Government has

claimed and obtained redress from for
and other wrongs done to American citizens
in violation of international law or treaty.

The same principles have also been in
question of wrongs done to foreign subjects
by authority. In this respect I need, I am sure,
your excellency's attention the many cases in which
in obedience to the general feeling of justice
of the United States, has, upon representation made
granted indemnities to foreign subjects
wronged by American authorities.
I call your excellency's attention to the case
No. 256, Fifty-fifth Congress, second
session, sixth Congress, second session, which covers
the present case.

According to instructions received from
the honor to ask your excellency kindly
indemnity for the unlawful arrest of the
Norwegian ship *Ingrid* renewed consideration
best possible solution.

Please accept, Mr. Secretary of State,
my highest consideration.

No. 237.]

DEP
H

Mr. H. BRYN, *Minister of Norway*.

SIR: I have the honor to acknowledge
your letter of May 31, 1913, in which you refer
to your letter of October 29, 1911, in regard to the present
Government against this Government on the
authorities of Hudson County, N. J., in
advance as witnesses in a criminal case in
violation of treaty provision between the United States
Government contends, three members of
ship *Ingrid*. The department has given
careful and careful consideration, but does not
assume liability on the part of this Government
requested in the legation's note of July 28,
for the sailors and the sum of \$1,587.78, the
expenses in connection with habeas corpus
instituted to obtain the release of the sailors.

As you will recall, the facts and circumstances
of the claim are briefly stated as follows:

On February 1, 1911, a cargo of dynamite
causing considerable damage to the *Ingrid*
harbor near the place where the accident
after the explosion had taken place, three
of the *Ingrid* were arrested by the New Jersey
authorities in the Hudson County jail, they being
witnesses in the case involving the responsibility
of the harbor. The consul general of Norway
with the local authorities regarding the

seamen be released, but the authorities refused this request, basing their refusal on certain provisions of the law of New Jersey, which they represented, authorized the detention of the men as witnesses. At the instance of your legation, the department brought the complaint of the seamen to the attention of the governor of New Jersey, who in reply advised the department that it seemed plain to him that it was necessary to detain the men for the present, in order that justice might be successfully administered in the serious matter of the explosion. On March 6, 1911, an order for the release of the sailors was issued by the Circuit Court of the United States for the District of New Jersey, in which habeas corpus proceedings had been instituted. It thus appears that the men were detained about a month being held for this length of time as witnesses in default of furnishing bonds in the sum of \$500 each.

Under date of September 23, 1911, the department advised your legation that the governor of New Jersey, to whom the claim presented by you had been referred, had informed the department that the attorney general of New Jersey had expressed the opinion that the members of the board of chosen freeholders of the county of Hudson were the persons responsible under the conditions presented in the case (if legal liability attached to any of the officials concerned in the matter) and that the prosecutor of pleas of the county might be joined with them in a civil suit. The department suggested that in view of this opinion, the seamen should exhaust their legal remedies in the appropriate courts before resort could properly be had to the presentation of a diplomatic claim in their behalf.

It seems clear that the local New Jersey authorities acted in good faith and with due observance of the forms of law in holding the seamen as witnesses. The measures taken to detain these men were such as citizens of this country whose testimony it should be deemed important to have with a view to insuring the proper administration of justice might be subjected to in a given case. If a Government may not use against aliens, as well as against its own nationals, the recognized methods of procuring the attendance of witnesses in criminal cases, including that of binding witnesses by recognizance to appear and give testimony, then its criminal procedure may at times be rendered wholly ineffective.

However, as previously observed, in the particular case under consideration, the Federal courts at Trenton, N. J., directed the release of the seamen of the *Ingrid* on application being made to it for that purpose through proper judicial proceedings. It appears therefore that the alien seamen of the *Ingrid*, although temporarily detained under the order of an inferior State tribunal, were promptly discharged on application to the proper department of this Government, and that there has been no violation of the rights which were asserted in their behalf by your Government under the following treaty provision, contained in Article VII of the treaty of amity and commerce concluded April 3, 1783, between the United States and Sweden:

All and every the subjects and inhabitants of the Kingdom of Sweden, as well as those of the United States, shall be permitted to navigate with their vessels in all safety and freedom, and without any regard to those to whom the merchandise and cargoes may belong, from any port whatever. * * *

STEAMBOAT-INSPECTION SERVICE

. L E T T E R

FROM

THE ASSISTANT SECRETARY

TRANSMITTING

**DRAFT OF A BILL TO AMEND SECTIONS 4404
STATUTES OF THE UNITED STATES, TO PRO-
VIDE FOR 10 SUPERVISING INSPECTORS IN THE
STEAMBOAT-INSPECTION SERVICE AND STRIKING OUT THE PRESENT
SECTION 4405 THAT THE SUPERVISING INSPECTOR OF THE
COAST SHALL NOT BE UNDER OBLIGATION TO ATTEND
THE BOARD OF SUPERVISING INSPECTORS OF STEAMBOAT-
INSPECTION SERVICE OFTENNER THAN ONCE IN TWO YEARS.**

OCTOBER 10, 1914.—Referred to the Committee on Inter-
state and Commerce and ordered to be printed.

DEPARTMENT OF COMMERCE
OFFICE OF THE ASSISTANT SECRETARY
Washington

MY DEAR MR. SPEAKER: There is inclosed a bill proposing to amend sections 4404 and 4405 of the Revised Statutes, providing for 11 instead of 10 supervising inspectors in the Steamboat-Inspection Service, and striking out the present section 4405, Revised Statutes, that the supervising inspector of the coast shall not be under obligation to attend the Board of Supervising Inspectors of Steamboat-Inspection Service oftenner than once in two years.

The territory embraced in the first supervising inspector is at present too large for one man to supervise. It is proposed to divide the first supervising inspector into two, one at San Francisco, California, to be in charge of the local inspectors at San Francisco and Honolulu, Hawaii; and the new supervising inspector to be stationed at Seattle, Wash., and be in charge of the inspectors at Seattle, Wash., Portland, Oreg., and St. Michael, Alaska.

It is believed that this would result in getting better work from the two supervising inspectors than from one, for the reason that each supervising inspector having a smaller district could give more detailed attention to the work of the local inspectors under his direction. It is impossible for one man to properly supervise a district which is as large as the first supervising inspection district.

Under the provisions of section 4405, Revised Statutes, the supervising inspector for the district embracing the Pacific coast is not under obligation to attend the meetings of the Board of Supervising Inspectors oftener than once in two years. For the past several years the supervising inspector on the Pacific coast has attended the meetings of the Board of Supervising Inspectors each year, and it is desired that the law be so amended as to make it obligatory for him to attend every meeting of the Board of Supervising Inspectors, as his presence at these meetings is absolutely necessary.

It is recommended that the bill be enacted into law.

Very truly, yours,

E. F. SWEET,
Assistant Secretary.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES,
Washington, D. C.

AN ACT To provide for the appointment of 11 supervising inspectors, Steamboat-Inspection Service, in lieu of 10.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section forty-four hundred and four, Revised Statutes of the United States, be, and the same is hereby, amended so as to read as follows:

"Sec. 4404. There shall be eleven supervising inspectors, who shall be appointed by the President, by and with the advice and consent of the Senate. Each of them shall be selected for his knowledge, skill, and practical experience in the uses of steam for navigation, and shall be a competent judge of the character and qualities of steam vessels, and of all parts of the machinery employed in steaming. Each supervising inspector shall be entitled to a salary of three thousand dollars a year, and his actual and reasonable traveling expenses incurred in the performance of his duties, together with his actual and reasonable expenses for transportation of instruments, which shall be certified and sworn to under such instructions as shall be given by the Secretary of Commerce."

Sec. 2. That section forty-four hundred and five, Revised Statutes of the United States, be, and the same is hereby, amended by striking out the following words:

"The supervising inspector of the district embracing the Pacific coast shall not be under obligation to attend the meetings of the board oftener than once in two years, but when he does not attend such meeting he shall make his communications thereto, in the way of a report, in such manner as the board shall prescribe."



WITHDRAWAL OF HOUSE DOCU

LETTER

FROM

THE SECRETARY OF AGRICULTURE

REQUESTING

WITHDRAWAL OF LETTER OF SECRETARY
DATE OCTOBER 14, 1914, IN REFERENCE
OF COTTON, PRINTED AS HOUSE DOCUMENT

OCTOBER 19, 1914.—Referred to the Committee on Agriculture
printed.

DEPARTMENT OF AGRICULTURE
Washington

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES

SIR: I have the honor to request that the letter submitted to the Speaker of the House under date of October 14, 1914, in reference to pink boll worm of cotton and printed as House Document No. 1175, be withdrawn from distribution for the following reason:

A further investigation of the infested area in the Department of Agriculture on the ground reveals the fact that the pink boll worm was present, but that it is not the Egyptian cotton worm. The specimens examined at the time were immature specimens reveals the fact that the pink boll worm, that the destruction caused by a plant disease, and that this pink boll worm, appearing on the plant, is in reality a plant disease.

It appears, in the light of these facts, that the Department of Agriculture has adequate power and facilities for dealing with the pink boll worm.

The facts in our possession at the time just mentioned, of course, it would have been a serious misapprehension of the nature of the worm had been no authority for action by the Department of Agriculture.

Respectfully,

D. F.

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